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The DENTAL DIGEST

August
1933

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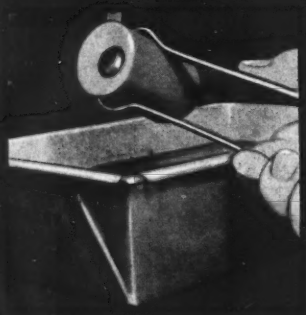

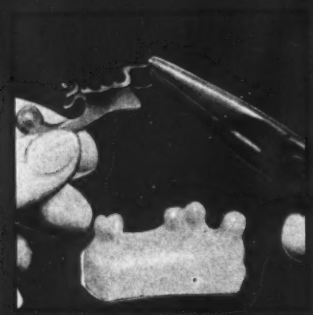

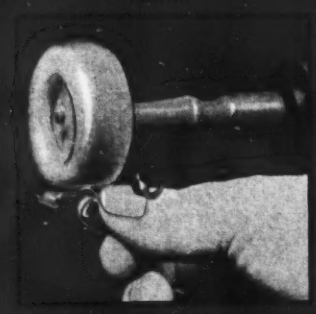

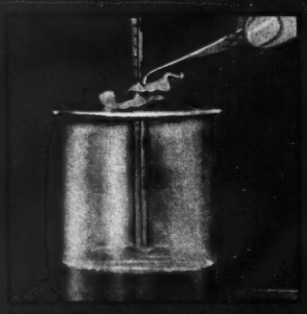

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The DENTAL DIGEST

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THIRTY YEARS OF GOLD FOIL

FORRY ROHRER GETZ, A.B., A.M., D.D.S.
New York

THIS is not intended to be a treatment of the subject of gold foil from a chronologic or bibliographic standpoint, but rather a condensed presentation of personal experience with the use of the foil filling in the hope that it may arouse a new interest among many dentists who have practically discontinued its use, and among those who in their student days inserted not many more foils than were necessary to graduation.

Thirty years ago when I was a student in the Dental Department of the University of Pennsylvania, an old patient showed some gold fillings which he said had been put in thirty years previously. In the Junior year a fellow student inserted five gold foil fillings for me in bicuspids and molars. The bicuspids were finally lost a few years ago, because of a previous abscess and faulty root canal therapy, but the two gold foil fillings in the molars have continued to give service for thirty years as in the case of the man just cited. Both of these were later cut with lug rests to carry the lug of a removable bridge; one has served since 1905 and the other since 1922. This authentic and particular information is given only as corroborative evidence of the assertions made many times in one form or another, that of all the substances at our command for a filling material, gold foil is the best.

I recall the controversies and plugging contests between dentists using various methods of condensation to see which could secure greatest density and specific gravity, A few, I believe, almost succeeded in securing a welded density equal to that of molten gold. These tests were of necessity made out of the mouth. Which method proved most efficient I do not now recall, nor is it an important point, for, within reasonable limits of thoroughness, to produce homogeneity it is not necessary to secure the extreme condensation to make a foil filling that will not only preserve the tooth but will wear well under stress over a long period of years.

In the old days the methods that were employed to condense, consisted of direct hand pressure; burnishing under pressure of a ball burnisher; the long plugger and hand mallet; the automatic mallet; the mechanical mallet and the electric mallet.

Before the advent of the swaged and cast gold inlays, the size of a cavity was no deterrent for placing a gold foil, provided the patient wanted the best and would stand for both punishment and price. In those days it was not unusual for an operator to consume from three to four hours in completing a compound contour gold filling. I know of one dentist who frequently made a large cavity preparation, plugged in half of the filling, covered it with gutta percha, and finished the filling a day or two later. It was necessary to clean the unfinished surface carefully with chloroform and alcohol and sometimes to freshen the surface by scraping or cutting with a sharp bur.

For me the automatic mallet was too slow and it could not be used effectively to condense except in a straight line. Some of the older members of the profession will also recall the small special combination mallet with short pluggers designed to work at a right angle for use in the posterior teeth. The electric mallet was an efficient and rapid condensing instrument but trying on the patient, and only a few well-trained patients could or would endure more than a few fillings. It caused much pericementitis, and I soon discarded the electric mallet in favor of the less violent but also thoroughly efficient mechanical mallet.

The technique with either electric or mechanical mallet is about the same. The method of starting a filling and the form of the gold for condensation are identical. To forestall any misconception on the part of the reader as to size and extent of areas where I have continued to use the foil gold filling, it is probably necessary to say that for esthetic reasons the silicate restoration, even with its lack of permanency, and the care with which it must be handled, has taken the place of gold in the more visible areas, and the gold inlay has taken the place of large foil fillings and long and fatiguing sittings.

I use gold foil mostly in the bicuspids and molars, occlusal fissures, small approximo-occlusal cavities, bucco-gingival areas and buccal pits, and other areas, such as basilar pits in upper laterals and posterior surfaces of centrals and laterals where the enamel has been cut away by the lower incisors. I use gold foil also for making surfaces for removable bridges and the free end of fixed bridges. I also use foil on the edges of worn incisors, the cupped-out cusps of cuspids, bicuspids, and molars, and also in the worn palatal surfaces of upper incisors referred to; but in all these last mentioned areas, it is a platinum and gold foil, and that is another story.

My technique of cavity preparation differs somewhat from the generally accepted forms in that I do not extend cavity margins unnecessarily and do not use sharp angles for retention. Also, I do not separate in preparation for an approximo-occlusal restoration, but secure space with the mechanical separator at the time of operation and finishing, the discomfort in that way being much less than the continued pericemental soreness that goes with several days of separation and subsequent malleting on an already painful tooth.

Retention

In undercutting for retention, I do not use inverted cone burs in the floor or flat surfaces of cavity preparations, but a semispherical bur. They are not on the market. I make them from a number 0, number ½, number 1, or number 2 plain round leaf bur, either handpiece or right angle. One can make a dozen various sizes in ten minutes by taking a 1 inch diameter carborundum stone mounted on a handpiece mandrel, holding the shank of the bur parallel with the stone mandrel, and with the head of the bur against the flat underside of the stone. By holding it up to the light one can see how much is being ground off of the bur. I take off about a third and others about a half of the bur. In making the undercut, this bur, with the flat side on the floor, can be run around the cavity walls, making at the base a smooth groove of even depth and with no acute angles all the way round.

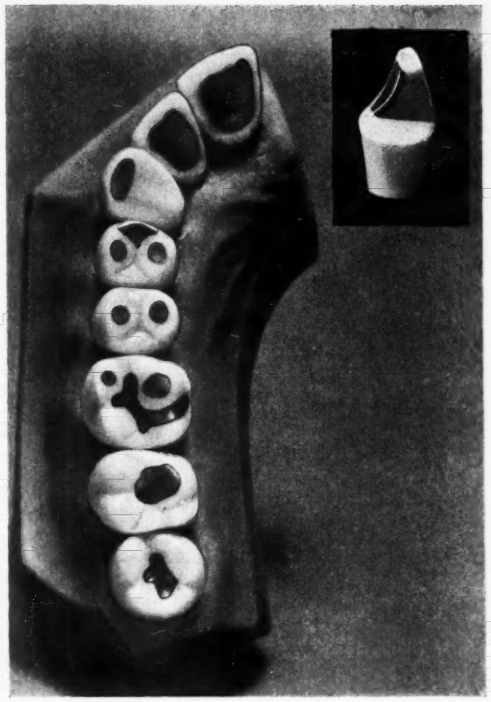


Fig. 1—Gold foil and platinum and gold foil fillings shown in areas and surfaces where the author of this article has continued the use of ribbon foil in hundreds of cases. The darker colored fillings are made of gold foil, the lighter colored ones of platinum and gold foil; the differences in color of these finished fillings show even in a photograph.

The inset shows a vertical section of a platinum and gold foil filling in the palatal surface of an upper central incisor. Note the comparative thinness and veneer-like character of this restoration. This type of filling is made most easily with the use of ribbon foil and the method of plugging outlined.

Fig. 1

Fig. 2—Old electric annealer types which have been off the market for years and are no longer obtainable.

Fig. 2

Instruments

The following instruments are needed to start the filling:

1. A number 10 Darby-Perry Plugger, C. S. and number 12 vulcanite handle.
2. A number 11 Darby-Perry Plugger, C. S. and number 12 vulcanite handle.
3. A number 27 S. S. White Ball Burnisher and a long handle.
4. A number 27, Special, S. S. White Ball Burnisher and a long handle.

The burnishers are modified by grinding off half the ball and repolishing the surface.

5. Two old explorers, number 17 or number 1, with the point blunted slightly to carry a small amount of cement.
6. S. S. White Corona, or as it was formerly called, moss fiber gold, is used for starting practically all fillings. It is annealed.

If the cavity is small no cement need be used but a piece of moss fiber slightly larger than the floor of the cavity is introduced and with the two pluggers is flattened out on the floor and forced into the undercut already described and burnished with modified ball burnishers. To keep the starting piece from rocking, it must be held with one plugger while condensing, and forced down with the other.

If the cavity is too large or of a shape in which it cannot be made to stay by the undercut, a small amount, actually only a film of cement, is spread on the surface and the moss fiber over it, and burnished when dry.

Technique

Instruments for Filling—(1) An S. S. White engine or mechanical mallet to interchange with the Doriot handpiece on a Doriot Arm; (2) Darby-Perry, number 13 gold plugger; (3) Darby-Perry, number 14 gold plugger; (4) a Black automatic mallet, number 7; (5) a Black automatic mallet, number 8; (6) a Royce, number 17, foot plugger; (7) an electric annealer, which is much more convenient than the hand annealer.

All pluggers should be faced with the finest serrations possible; but even

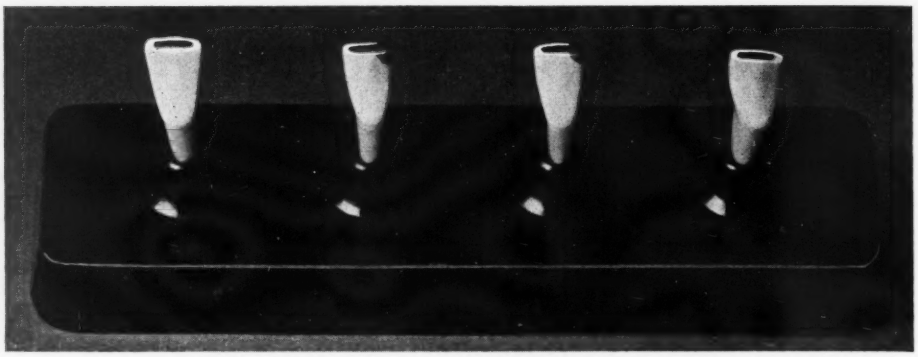


Fig. 3—Incisal and approximal incisal fillings of gold and platinum foil in the lower incisors.

a smooth-faced plugger will weld and condense the ribbons of rolled foil.

Procedure—The filling gold is not a beaten but a rolled foil known as Rowan's Decimal Rolled Gold Foil, numbers 20, 30 and 40, numbers 20 and 30 being used mostly. The foil is cut into narrow, medium and wide strips, and annealed. The number 20 is used for starting on the moss fiber, though narrow number 30 may also be used, and places where it can be more readily malleted in close contact than the number 30. Number 40 and even number 60 may be used on open areas.

The small ribbons are picked up by one end on the plugger point and folded back and forward by the plugger as it is malleted down.

There are comparatively few instruments necessary; they are not expensive and anyone who will take a little trouble to master the technique will be well repaid in personal satisfaction for what he can do, and in rendering superior service.

730 Fifth Avenue.

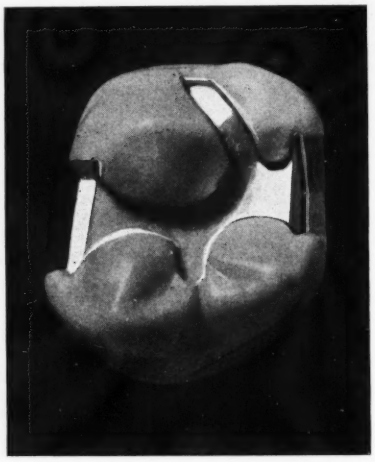


Fig. 4—Compound cavity preparation in a molar showing the type of rounded undercut and retention. This runs on the occlusal surface as well, only it is not as clearly visible. The posterior preparation has been touched up and does not give exactly a correct presentation.

Occlusal and approximal cavity enamel margins are beveled or rounded somewhat to protect the ends of the enamel rods, as in the accepted form of cavity preparation for foil.

In my own preparation the only other difference is that instead of angular undercut for retention in the buccal and palatal or lingual walls of approximal preparations on bicuspids and molars, I make a rounded groove with a small square-end right angle fissure bur, either plain cut or plug finishing. These burs I had made up and are about the size 68, 69 or 70 on the Brown and Sharp twist drill and steel wire drill rod gauge. It is easier to adapt gold to such a rounded surface. Also the cervical seat, instead of being flat, has its retentive form increased by deepening it somewhat in the floor at the inner or pulp wall of the cavity with a Gillett chisel number 11 or 12, or with gingival margin trimmers.

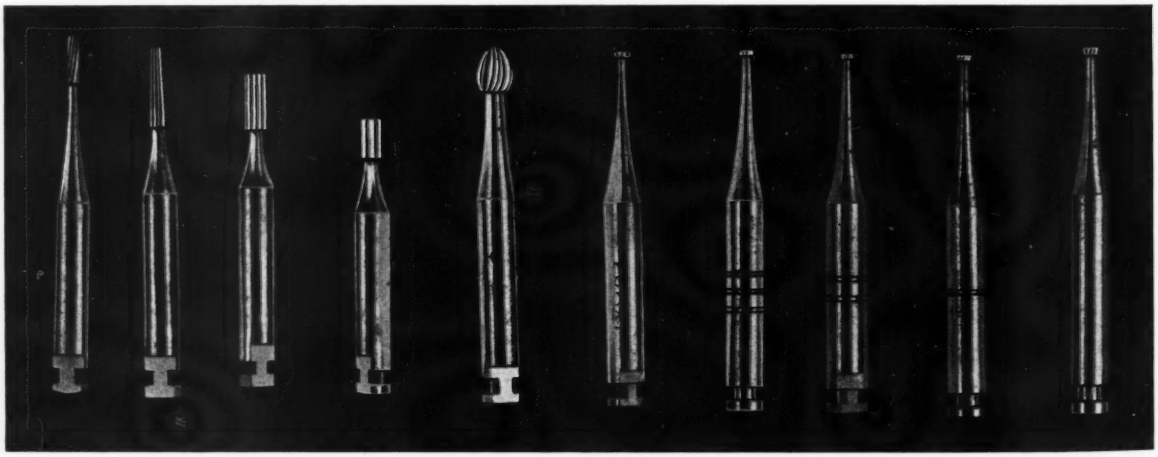


Fig. 5—Series of right angle burs used in preparing cavity walls (the bud for occlusal and incisal marginal and enamel beveling) and small round burs modified, as described in the text, for making undercut and retention.

Fig. 6—Series of gold working instruments (left to right): two starting pluggers; two flat-faced burnishers; a mechanical mallet to interchange with Doriot handpiece (no longer on the market); a series of small-faced and finely serrated gold pluggers with the surface condensing and foot pluggers; three gold knives, especially long and strong general purpose pliers (not essential but extremely satisfactory wherever such pliers must be used).

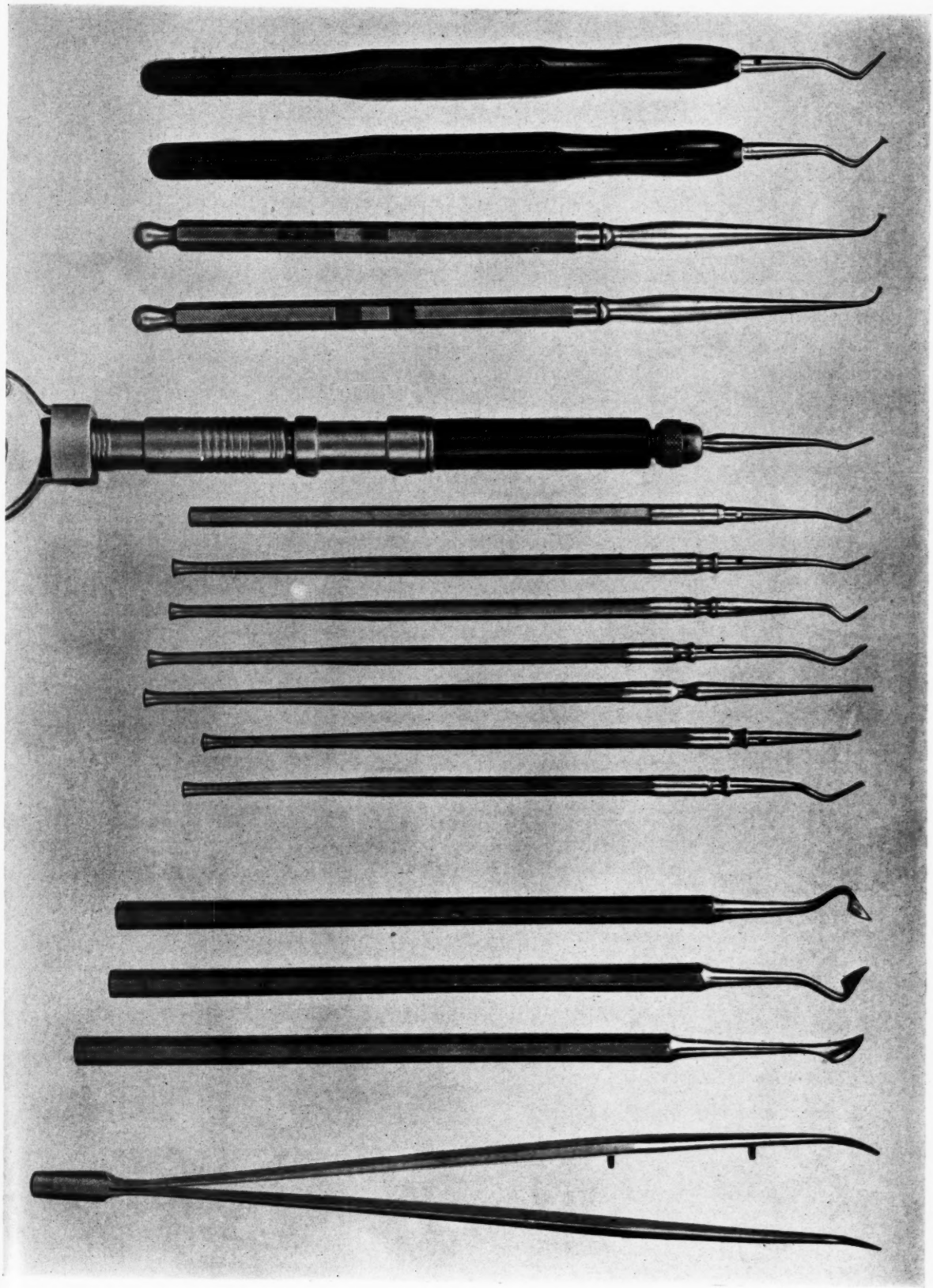


Fig. 6

SIMPLIFIED BITE REGISTRATION

W. D. OLSON, D.D.S.
Salem, South Dakota

BECAUSE there is a growing tendency on the part of dentists to make dentures for their patients themselves rather than send them to be made at the dental laboratories, there is likewise a growing interest in the various methods of taking impressions, and registering the bite. I believe that the establishment of the relation of the upper bite to the lower is not only the most important step but the one that causes the most difficulty. I have tried every system that has been brought to my attention and have devised new ones, and have finally settled on a system that works well in my hands and is herewith described.

TECHNIQUE

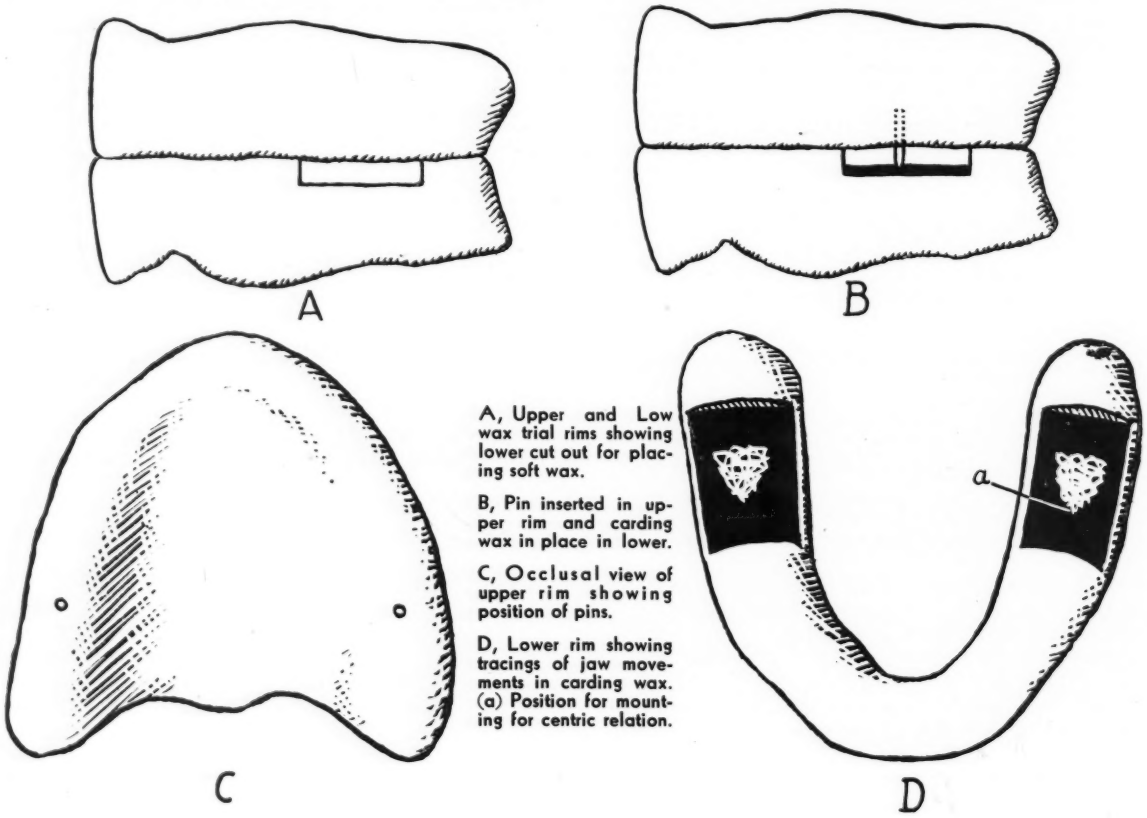
1. When the bite rims are built up to the proper height and contour to suit the case (I use a base plate built up with pink base plate wax for strength), a section is cut out on each side of the lower impression in the molar region about 20 mm. long and 3 mm. deep, or deeper depending on the height of the rim. Black carding wax or pure beeswax is then used to build up the floor of this cut out section 1 mm. This leaves a window 2 mm. deep and 20 mm. long with a soft wax floor.

2. Two victrola needles which may be cut off if too long are then heated and inserted in the upper ridge so that the points protrude 2.5 mm. and come about in the center of the window in the lower impression when in proper occlusion. The points extend into the carding wax about 0.5 mm.

3. Denture powder is now sprinkled on the trial plates which are then inserted in the mouth, and the patient is told to go through all possible movements of the mouth. Plenty of time should be taken and the patient should in the meantime be engaged in conversation so that the movements will be unconscious and natural. When the trial plates are taken out the operator will find that the pins have registered the working range of the mandible in the shape of a triangle.

4. The plates are mounted on the articulator with the pins at the anterior angle of the triangle. This will give the most retrusive position or centric relationship. The articulator can be set to accommodate the lateral movements according to the tracing which can be easily seen.

The advantages of this system are (1) simplicity, speed and ease; (2) the patient does not know what is being done and therefore will not try to help and consequently do the wrong thing as so often happens when a stylus and smoked graph plate are used; (3) the muscles and lips are in normal position, thus assuring greater accuracy; (4) new equipment need not be purchased.



A, Upper and Low wax trial rims showing lower cut out for placing soft wax.

B, Pin inserted in upper rim and carding wax in place in lower.

C, Occlusal view of upper rim showing position of pins.

D, Lower rim showing tracings of jaw movements in carding wax. (a) Position for mounting for centric relation.

SURGICAL TREATMENT OF PATHOLOGIC PERIODONTAL POCKETS

WESLEY V. BUCK, D.D.S.
Minneapolis

PYORRHEA (paradentitis, paradentosis, periodontitis simplex and complex, pericementoclasia, chronic suppurative periodontoclasia) results when the normal gingival groove of approximately 1 mm. has enlarged and deepened and a pathologic pocket has formed alongside the root. Such changes are accompanied clinically and roentgenographically by soft tissue inflammation and bone disturbances. Normally the gum clings tightly to the neck of the tooth and forms only a shallow groove called the gingival crevice or sulcus (normal pocket). The gingival crevice under natural conditions is self-cleaning (Fig. 1).

Once formed, the (pathologic periodontal pocket) pyorrhea pocket (Fig. 2) shelters pyogenic bacteria and food débris which irritate the epithelium lining the pocket, and as a result, an ulcerated area develops on this pocket epithelium. Tartar (salivary and serumal calculus) forms on the root surface. Pus accumulates in the deepened pocket. The crest or edge of the adjacent alveolar process loses its cortical layer, becomes roughened and reduced in length by resorption, and a state of well defined pyorrhea exists. It seems that all of the destructive tendencies which are continuously at work in the pocket unite to set up a vicious circle of irritation, inflammation, bacterial invasion and growth, destruction of enamel epithelium, resorption of alveolar process, detachment of periodontal membrane, absorption of toxin and bacteria into the adjacent tissue and blood stream, and lowered resistance. Thus a favorable field is created for such tendencies to continue a never-ending cycle of destruction as long as the pyorrhea is present. To treat such a condition both the cause and the disease process itself must be dealt with, for it is of little avail to attempt the control of the condition without full management of the one as well as the other.

The causes may be local or constitutional or a combination of the two. The local causes usually are removed easily, but the constitutional causes may be numerous and perhaps obscure. On this account the physician and dentist should cooperate closely, because after the pyorrhea has been treated properly the prevention of its return becomes important.

In this article the various causes and their complications are not discussed in detail. It is my purpose to deal with the treatment of the disease process as it is found in the mouth and outline a method of eliminating the existing pyorrhea pocket quickly and efficiently.

Treatment

After the patient has been freed of the pyorrhea pocket and relieved of the existing infection, an attempt can then be made to remove every underlying cause in order to prevent the return of the pyorrhea; hence local treatment becomes of first importance. It is easier to treat the disease process itself than it is to eliminate all of the underlying causes. Since the pocket is the chief disease factor, it should be dealt with first. One efficient and rational method by which to remove the pocket has been surgical.

The pocket has two walls, the root of the tooth on the one side forming one wall and the invaginated gum forming the other. If the tooth is extracted the pyorrhea disappears because one of the walls has been removed. It would seem reasonable to remove the other wall; namely, the loose gum tissue, and thus eliminate the pocket. When this is done the pyorrhea tends to disappear for want of its characteristic pathologic pocket. Surgical treatment removes this pocket and teeth are saved for continued usefulness.

Technique

1. The loose gum which is ulcerated on its inner or pocket surface (Fig. 3) is anesthetized either locally or with block anesthesia, and with proper lancets is trimmed away to the depth of the pocket or level with the alveolar process.

2. This alveolar process, which is rough and somewhat necrotic on its affected crest, is smoothed with curets.

3. The whole denuded area is then packed with a sedative dressing cement. The pack sets in about five minutes as a hard putty and is left on at least ten days to protect the cut tissue and to permit undisturbed healing (Fig. 4).

4. After ten days the packs are removed, the root surfaces polished, and the gums toughened to a hard pink texture.

5. Occlusal equilibrium is established as far as possible by the proper grinding, following which gum chewing with a large bolus of gum for half hour periods, three or four times a day, is recommended as a massage for the next five or six days when toothbrushing can be resumed, lightly at first and gradually increasing to a thorough and vigorous technique.

The whole process from excision of gum tissue to toothbrushing requires an average of sixteen days, a comparatively short period to accomplish so major an undertaking as the elimination of pyorrhea.

Results

When the pocket and its disease processes have been removed and the pyorrhea *per se* is eradicated (Fig. 5), a new gum margin develops under the packing during the ten days. At the same time a new cortical layer starts to form over the crest of the alveolar process, both of which are free from infection and will furnish a hard fresh new gingiva tight around the tooth, restoring the normal gingival crevice of about 1 mm.

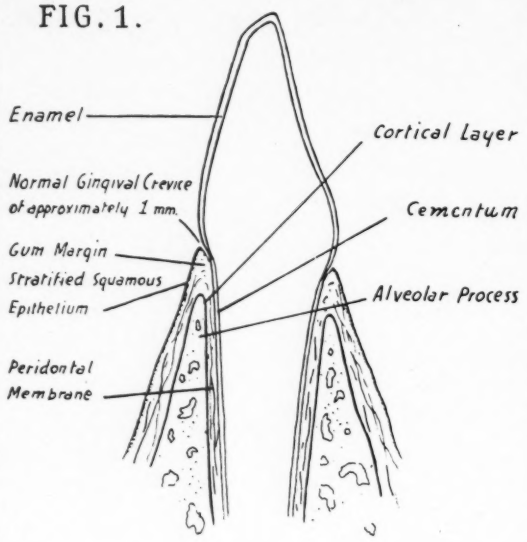
The teeth can be kept clean easily and thoroughly. The gum with its new vitality will grip tightly around the tooth and will be tough, hard and pink. The former abnormally deep gingival pocket is changed to one that is shallow and normal and free from débris and infection.

Postoperative Care

It now becomes important to maintain the mouth in good health. All constitutional factors underlying the pyorrhea must be eliminated in cooperation with the physician. The dental surgeon must try to eliminate all causes of the disease: malocclusion, irritating overhangs of crowns and fillings, and all other irritants. It

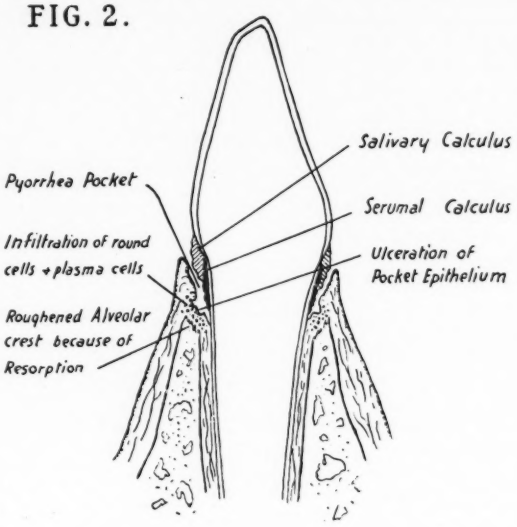
NORMAL STRUCTURES

FIG. 1.



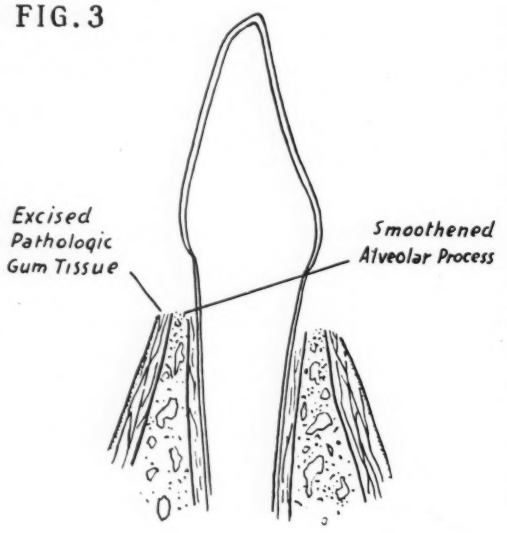
ADVANCED PYORRHEA

FIG. 2.



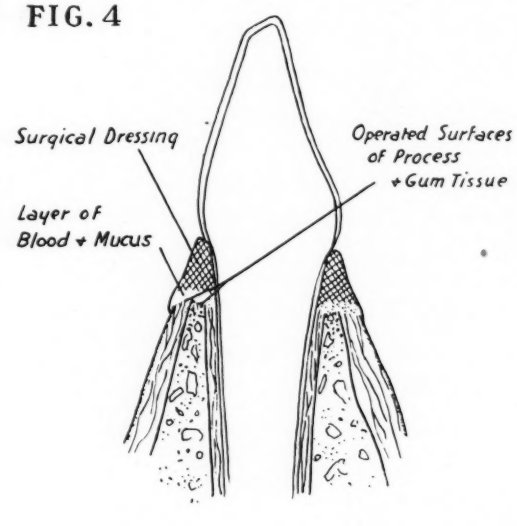
SURGICAL RESECTION

FIG. 3



PACKED AREAS

FIG. 4

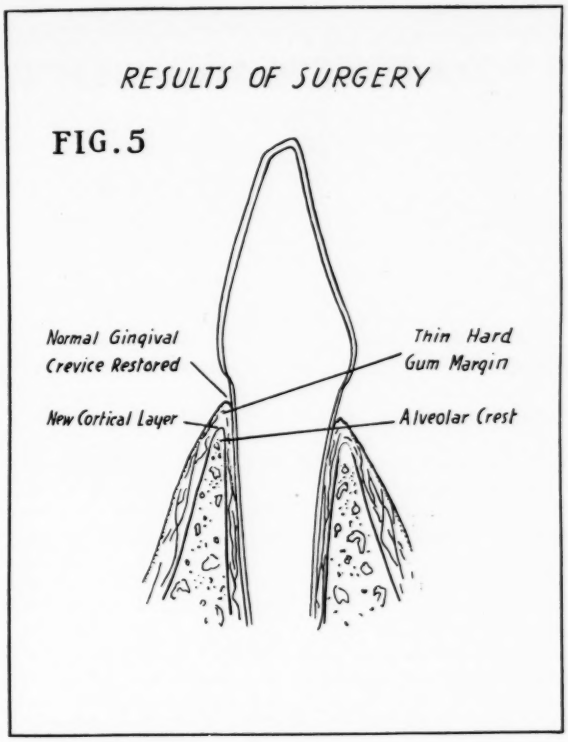


should be recommended to the patient to replace all defective dentistry with well designed restorations and to construct bridges or partial dentures if teeth are missing. In replacing teeth, due care must be shown to restore functional anatomy and functional occlusion.

Regular appointments for inspection and prophylaxis are advisable. Proper instructions should be given to the patient both in toothbrushing and interproximal massage as a part of the patient's home care at least once a day.

The cementum which now is exposed to food and liquids is not sensitive because the operation is not

carried below the attachment of gum to root or beyond the bottom of the pocket. In fact, the cementum was desensitized earlier by the débris and bacteria continuously retained in the pocket. If sensitive spots are found they can be treated easily by mixing a few drops of 64 per cent zinc chloride into the prophylaxis paste and rubbing the paste on affected places with porte-polisher or with a rubber cup. Following such treatment the patient can be given a mouthwash of 2 per cent zinc chloride to be used once a day at home for a week or until sensitiveness disappears. Sensitive areas may also be coated with formalin, and by immediately pressing warm temporary stopping against the coated area for a few moments and removing, the sensitiveness is greatly reduced.



Conclusions and Inferences

1. Pyorrhea can be eliminated when surgical procedures are applied rationally.

2. The return of pyorrhea can be prevented definitely by removing all causes and applying well defined principles of oral hygiene including the maintenance of balanced functional occlusion.

3. The rational application of surgical procedure may be termed "conservative treatment," because time, expense, teeth, health to the tissues, physical and dental comfort, maximum use of teeth, clean appearance of entire peridontium, ease of home care, and confidence of patient are all conserved.

4. Surgical cases do not require hospitalization. Surgery is not a spectacular performance; on the contrary, it is a modest and efficient service, expediting pocket removal and does not require checking back in a few days to see if the pocket is gone.

5. It must be remembered that 85 per cent of all periodontia patients are of the middle class or below. These have neither the means nor time to invest in protracted and numerous treatments. Many of them believe there is no cure for pyorrhea and prefer extraction to the expense involved and doubtful prognosis of treatments; therefore removal of the pathologic gum tissue is inconsequential when compared to the loss of a useful tooth.

6. Inasmuch as carefully applied conservative surgery eliminates the pocket the dental surgeon has a simple yet thorough technique whereby a definite assurance can be given to the consulting physician that pyorrhea focal infection can be completely eliminated at a minimum expense and loss of time without extracting useful teeth.

7. The technique of the surgical treatment of pyorrhea is fairly simple, easily learned and applied. Other methods require exceptional ability and training in order properly to eliminate the pocket. The general practitioner has only a few periodontia cases as compared with those of the periodontist; nevertheless he should serve them efficiently. If the general practitioner has neither the time nor training to use a difficult technique then why should the periodontia needs of his patient be neglected when satisfactory results can be quickly obtained with surgery?

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Forry Rohrer Getz received his A.B. degree in 1901 and A.M. in 1904 from the Franklin and Marshall College, Lancaster, Pennsylvania, and his D.D.S. in 1904 from the University of Pennsylvania. Doctor Getz is the author of several technical articles on dental subjects published in the professional magazines. He is a member of the A.D.A., the New York State Dental Society, First District Dental Society, Psi Omega Dental Fraternity, and Omicron Kappa Upsilon. Doctor Getz was instructor in advanced courses in dentistry at Columbia University in the years 1921, 1922, 1923, and clinical professor of prosthetic dentistry at New York University in 1927 and 1928. Doctor Getz has a general practice but specializes in crown and bridge work and partial dentures.

William D. Olson received his D.D.S. in 1918 from the University of Illinois College of Dentistry. Doctor Olson is a member of the A.D.A. and component societies, and is engaged in the general practice of dentistry.

Wesley V. Buck has the Degree of Business Administration from Simpson College, Indianola, Iowa (1907) and his D.D.S. from the University of Minnesota College of Dentistry (1918). He is a member of the A.D.A., Minnesota State Dental Society, Minneapolis District Dental Society, and Delt Sigma Delta. Doctor Buck was instructor in business administration at the Sioux City Iowa High School (1908-1909), staff lecturer on oral hygiene to student nurses at St. Joseph's Hospital, St. Paul, Minnesota (1920-1930), and from 1919-1930 he was in charge of the dental department of the St. Paul Clinic, St. Paul, Minnesota. Doctor Buck is engaged in the general practice of dentistry featuring periodontia.

The biographies of C. J. Stansbery, D.D.S., Peter T. Swanish, Ph.D., and Weston A. Price, D.D.S., M.S., F.A.C.D., appeared in previous issues of The Dental Digest.

COMPLETE FULL DENTURE TECHNIQUE

V. FUNCTIONAL OCCLUSION CHECK BITES

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1. The masticating cycles all start from and end at centric occlusion, but their route and destination should be just as definite as is the starting point. All excursions of the mandible may be considered round trips from centric relation, and it is for the dentist to know the precise direction and distance to the destination of eccentric relations. Centric relation, which has been accurately determined by the centric check bite as desribed in Installment 4 (DENTAL DIGEST, July, 1933) is the starting point from which measurements must be taken (Fig. 45). The relationship of the left working bite in conjunction with balance contact on the right, known as balanced occlusion, should be well known to all prosthetists.

2. By comparing Fig. 45 with Fig. 46 the movement may be observed of the tip of the buccal cusp of the lower left molar as it goes from the position shown in Fig. 45 to the position shown in Fig. 46. This observation should include both the lateral movement or masticating range, and the vertical movement, termed the depth of the working bite. These two movements can be measured directly from the mold of the teeth being used, as illustrated in Fig. 47. The movements having been made in fixed relation to this working molar, the relation should be observed of the buccal cusp of the upper molar. Here again is an opportunity to observe the dimension of the tooth for the vertical movement, or depth of the balancing bite. The lateral movement of the balancing side is controlled by the lateral movement of the working side and the patient's rotational axis. As the lower molars are parts of the same solid, the mandible, it should be easily seen from the illustrations (Figs. 48 and 49) that the point midway between them will also have a vertical displacement which will be the mean between the two vertical measurements. This midpoint represents the location of the contact stud of the lower to the upper registration plate. It should also be evident that raising the screw an amount equal to this vertical displacement will separate the mandible from the maxilla the distance necessary to allow the mandible to move laterally, permitting the cusps of the lower molars to come into contact with the cusp points of the upper, as shown in Fig. 46.

3. The check-bite appliances in place on the edentulous ridges if viewed from the side will show the first molar region to be midway between the average rotational center and the point of contact of the style on the smoked graph plate. Thus as the mandible shifts laterally the style has twice the lateral movement of the first molar. This two to one relationship permits one to control with accuracy the masticating range of the first molar. For instance, if one wishes to have the molar move laterally 3 mm. the style will record a movement of 6 mm. The measurements in Fig. 84 closely approximate the average measurements of molds 32 and 34 of the Trubyte teeth. Similar measurements of other teeth may be ascertained by actual measurement as in Fig. 47. With this information at hand the operator is in a position actually and accurately to place the edentulous mandible in relation to the maxilla so that teeth set in centric relation will be in proper eccentric relation when the mandible is moved laterally and vertically according to these measurements.

The protrusive movement of the mandible exhibits a slightly different condition, the difference being that the entire mandible moves forward uniformly and not around a rotational point. The movement of the style, therefore, is not that of double any particular tooth but the same as all the teeth. Here the incising angle of the lowers to the upper incisors is a matter of the operator's judgment and it can be easily predetermined by the relation between the protrusive and vertical measurements; the protrusive to be determined by the excursion of the pin on the graph plate and the vertical by raising the central screw as in eccentrics.

4. With this exposition of the mandibular movements, the technique for taking eccentric check bites, one of the molds mentioned being used, is as follows:

After removal of the centric plaster check bite the screw in the lower registration plate is raised 1½ turns (Fig. 50), the plates being separated

Fig. 45—The vertical distance between A and B is known as the depth of the working bite. The distance between C and D, the depth of the balancing bite.

Fig. 46—The balanced relation in left excursion is here shown. The horizontal distance between A and B is the masticating range.

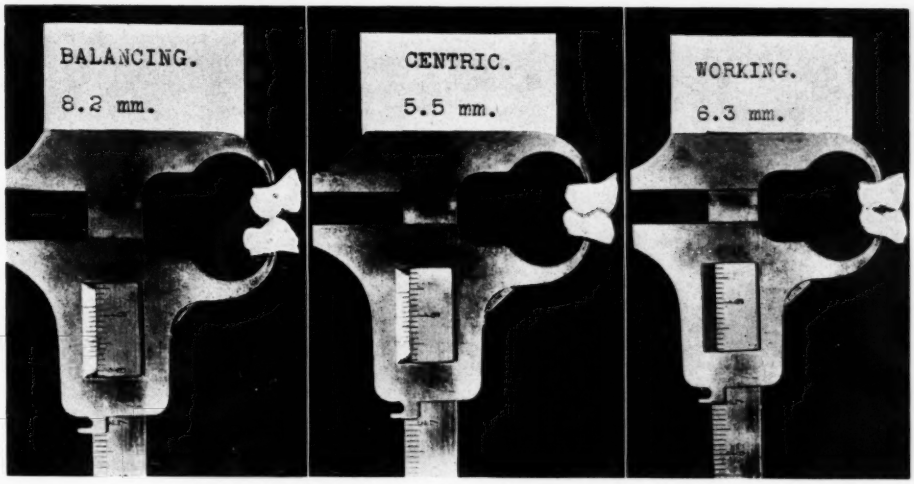

Fig. 47—Shows the method used in determining the measurements of various teeth.

1.5 mm. beyond that of centric (Fig. 51). The registration plates are now replaced in the patient's mouth and the patient is instructed to move laterally to the right and then to the left in the same manner as was used in obtaining the tracings for centric. The forced depression of the mandible will be accompanied by a slightly retrusive position carrying the graph plate slightly backward and so allowing the style to make this present tracing slightly forward of the one that the graph plate carries for centric (Fig. 52).

5. The plates are removed from the mouth, and from the apex of this new tracing one measures 6 mm. (one-fourth inch) on each line, and with a sharp-pointed instrument the 6 mm. position is indicated, as B and C in Fig. 53. At this time one should also complete the diamond shaped figure on the graph plate by drawing lines BD and CD. The lines are not shown but are illustrated in Fig. 52. The appliances are replaced in the mouth and the patient moves laterally toward the right or left (the right excursion is shown in Fig. 54) until the style point rests on the 6 mm. mark just made. The patient is instructed to hold this position firmly with moderate biting pressure while the plaster is injected between the plates exactly as described for the centric check bite.

BALANCING	8.2 mm.
CENTRIC	5.5 mm.
	2.7 mm.
WORKING	6.3 mm.
CENTRIC	5.5 mm.
	.8 mm.

AVERAGE OF —

2.7 mm. and .8 mm. is 1.75 mm.

or

$(2.7 + .8) \div 2 = 1.75$ mm.

Fig. 48—A tabulation of the measurements obtained in Fig. 47, and the mean of these measurements.

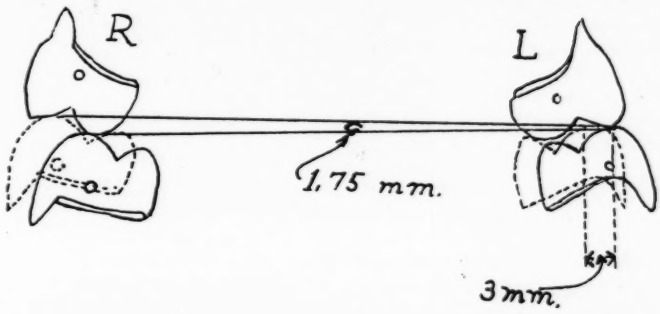

Fig. 49—A graphic summary of the previous illustrations. The upper straight line is from buccal cusp to buccal cusp in the position of centric occlusion (shown by the dotted outline). The lower line, from the same points while in left lateral excursion.

6. As the operator observes this setting plaster he should analyze the conditions under which it is taking place. The resiliency of the tissue on the ridges is overcome by the biting pressure exerted against base plates of true denture form, this form being the result of impressions taken under biting stress. Under the influence of pressure exerted at the central point of bearing it is manifestly impossible to exert more pressure on one side than on the other. The bugaboo of tilting bases which inevitably follows the use of bite rims in contact is thus completely eliminated. There is no lateral displacement of the base plates on the ridges owing to the lubricated contact of the central screw against the highly polished horizontal surface of the upper registration plate.

The direction in which the style point has traveled from centric relation to its present location is entirely under the control of the patient's individual movement. The left condyle has come downward, forward and inward, every element of this movement having had its effect on the space between the registration plates. On the right side any movement in any direction of the working condyle also has had its effect on the same space. The location of the rotational center could not be changed without varying the imprints of the upper and lower studs which this check bite carries (Fig. 58). It should thus be seen that the end-results of all the various and difficult measurements that have been demanded in previous techniques are here accomplished with this simple expedient of a plaster form.

7. When the plaster has set sufficiently, the base plates are removed, the plaster check bite laid aside, and, if necessary, the surfaces of the registration plates are again lubricated. If the right excursion was taken this plaster check bite should be marked

Fig. 50

Fig. 50—Method of raising the contact screw in the lower registration plate 1½ turns (1.5 mm.) to accommodate cusp height in lateral excursion.

Fig. 51—Compare with Fig. 36 and note the added height of screw A.

"Right." The identical procedure is once more followed for the check bite of the left excursion, the style point being made to rest on the 6 mm. mark at the opposite side of the apex. The resulting plaster check bite should be marked "Left." For the protrusive bite the mandible is moved forward until the pin rests at the point D and the plaster is injected as for the previous check bites. This check bite is marked "Protrusion" (Fig. 55). The esthetic arrangement of the artificial teeth having been previously accepted, and with the check bites now at hand, the patient may be dismissed until the dentures are ready for delivery, no further try-in being necessary.

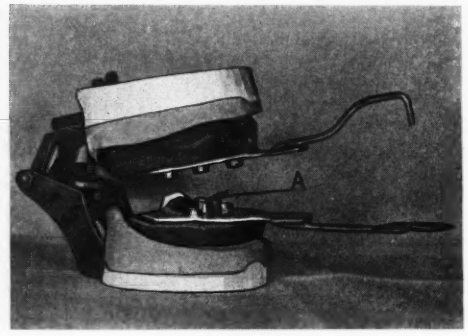

Fig. 51

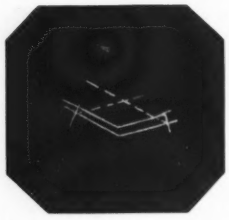

Fig. 52—A practical tracing on the smoked graph plate.

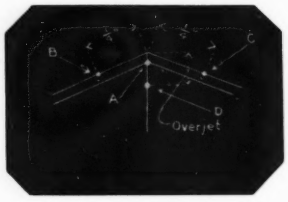

Fig. 53—A diagrammatic view of a graph plate tracing.

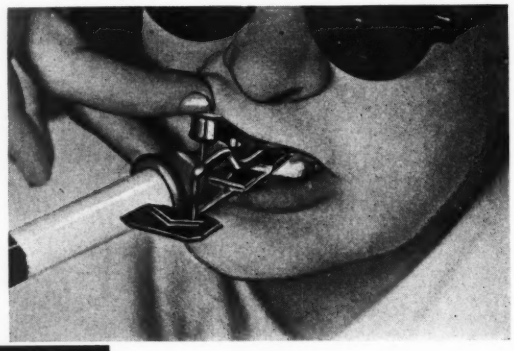

Fig. 54

Fig. 54—Plaster being injected for a right functional occlusion check bite. Note the position of the style on the graph plate and compare with Fig. 41, Installment 4.

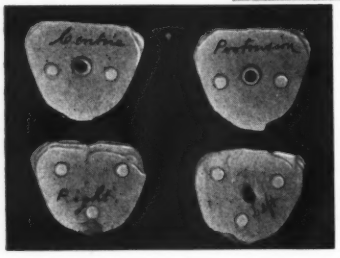

Fig. 55—A set of check bites, the two upper viewed from the under side and the right and left check bites viewed from the upper side. Note the stud arrangement.

8. In step 1 of Installment 4 (Dental Digest, July, 1933) the progress of the technique was summarized up to that point as: *Casts,* correct; *vertical height,* correct; and *a tentative closure* or *centric,* correctible. Step 7 of Installment 4 described the determination of correct *centric.* To this list is now added the correct *eccentric functional occlusions.*

While the immediate foregoing procedure completes the practical construction of the check bites, it may be well further to anaylze the results of the combination of the screw height and lateral movements. The transverse dimension of the average diamond tracing, closely similar to Fig. 52, in combination with the 1.5 mm. raise will give an incision direction at the screw point of approximately 17 degrees. If the condyle path is greater than this, the incisive path at the incisors will be less, and vice versa. In practice, if such a flat incisive movement is not desired the screw should be raised another half turn or even a full turn for a still steeper incisive path.

While the degrees of inclination of the condyle paths have not directly been determined downward, forward and inward, nor the amount of lateral shift or Bennett movement directly ascertained, nor the rotational axis or rotational points directly located, something of greater importance has been done; that is, the resultant of all these factors that enter into the various movements of the mandible has been determined.

Attention should now be given to the plaster discs, or the registrations. These records contain the individuality of the patient's movements, modified by absolutely no external restriction or influence. Everything that had any bearing on the patient's particular movement was allowed to exert itself and was registered in these plaster discs. In these discs, therefore, is seen the convergence of the many and various elements contributing to the functional positions of the mandible.

9. The movement of the point of contact of the screw is traced in centric against the upper registration plate as the point of the buccal cusp has been traced in its lateral excursions (Figs. 46, 49, and 56). In raising the screw this point has been dropped vertically 1.5 mm. and moved laterally 3 mm. to each side. An isosceles triangle constructed on these dimensions of a 6 mm. base and 1.5 mm. altitude exhibits an angle at its apex of 126 degrees. Doctor Gysi has said that from his research he

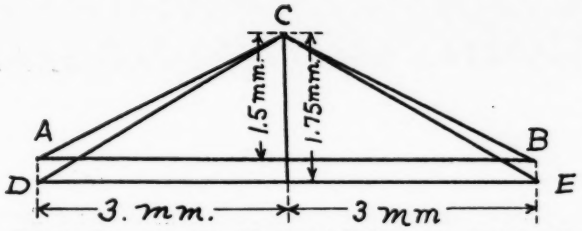

Fig. 56—The angle at C, of the triangle DCE, is approximately 120 degrees, which is the angle of the glazed unground molar as we receive it. The angle C, of triangle ACB, is 126 degrees, which is derived from the relation of vertical and lateral movements in the check-bite registrations. The two narrow triangles ACD and BCE represent porcelain removed to form facets.

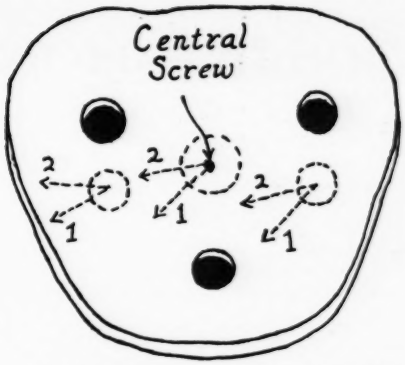

Fig. 58—The dotted circles represent the screw collar and studs of the lower registration plate of a centric check bite. The dotted lines numbered 1 and 2 represent the direction in which these indentations will move when under the control of rotational points 1 and 2, respectively, while taking right lateral check bites.

considers the most efficient opening angle for molar teeth to lie within the range of 122 and 130 degrees. The molars of the finished denture, lying so close to this control point, will vary only a little from this opening angle. Perhaps a discrepancy has been noted in that the actual measurement of the teeth as given in Fig. 49 calls for a screw opening of 1.75 mm. whereas only 1.5 mm. has been used. This one-fourth millimeter has been purposely omitted in order that the more obtuse direction might grind facets on the teeth during milling (Fig. 56).

10. While finished dentures have always been three dimensional mechanisms, attention must be called to the fact that with bite-rims only two dividual movements. When the screw has been raised for cusp height, the check-bite procedure has been taken out of the realm of two dimensional records and placed where it belongs: a truly three dimensional registration. Three dimensional check bites are to the two dimensional check bites in the same relation as stereoscopic x-ray films are to the ordinary flat films.

Reference to Fig. 57 shows the protrusive movement from A to B, and the lateral movement from A to C shows check bites all taken on the occlusal plane. It is evident that the positions B and C cannot be assumed by the mandible on account of cuspal interference; it is, therefore, unnecessary to register these impossible positions. Furthermore, it has been lightening. It will be noticed that the centric check bite is practically uniform in thickness. The check bite of right functional occlusion exhibits a greater thickness on the left side because of the downward inclination of the left balancing condyle, thereby placing the cast to accommodate the balancing relation of the cusps. The reverse is true for the check bite of left functional occlusion. The protrusive check bite, viewed from the side, will show the distal thickness thicker or thinner than the anterior

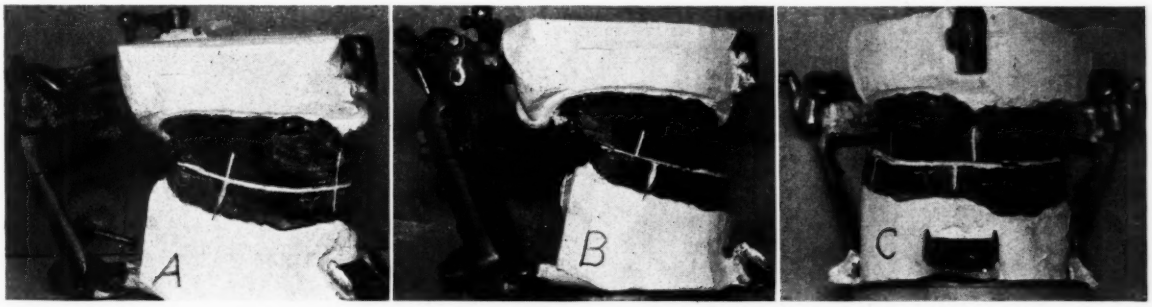

Fig. 57—Two dimensional check bites.

dimensions, lateral and protrusive, were ascertained from movements of the patient's mandible, and these without definite limitation of the masticating range. The third or vertical dimension was left to be forcibly injected into the finished denture by opening around an axis, by an arbitrary incisive guide, or by tooth cusps themselves. The technique herein described incorporates nothing within the finished denture that is not the result of the patient's controlled in-

amply demonstrated that the character of lateral movements changes with various degrees of opening, so that the lateral movements registered at the plane of centric occlusion are not true for the plane of cusp height. The two measured movements, therefore, are incorrect at the cusp height opening and the third vertical movement is entirely arbitrary.

11. An examination of the plaster check bites themselves will be en-

depending on whether the condyle path exceeds or is less than the protrusive inclination established by the central screw. The relationship of the indentations of the studs of the upper plate to those of the lower is a measure of the location of the rotational point. The indentations also bear a relation to the lateral shift or Bennett movement (Fig. 58).

The next installment will describe the denture tripod, the mounting of the casts and the tripod's adjustment.

(End of Fifth Installment)

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DENTISTRY AND THE INDUSTRIAL RECOVERY PROGRAM*

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ON MARCH 4, 1933, the country after three years of drabbling in the mire of a depression was prostrate on its broad back. One hundred and twenty million persons sat on thorns of apprehension and alarm. With a scared country and a frightened Congress, the crisis presented the chance in a thousand for a New Deal. The nature, the volume, and the speed of legislative accomplishment—only sixty hours of debate were consumed by the House in enacting the legislative program—under the persistent push of the President has left the country in a state of emboldened befuddlement.

Twelve measures constitute the legislative program, the purpose of which is to place from three to four million unemployed back to work by "snowfall." These measures may be classed as (1) schemes for the redistribution of wealth, and as such may have merit in the long-time, but they are not revival measures; (2) as punitive measures born out of the indignation of honest men who have discovered injustice and dishonesty in a price-profit competitive economy. This legislative program possesses most of the elements of a national system of planning: private ownership and operation remain, but Federal supervision and planning are established.

In this welter of legislation two classes, unemployed workers and farmers, especially the over-mortgaged and over-taxed farmer, are specifically underscored. That these two classes have suffered deeply goes without saying. But in this admittedly imperative effort to alleviate the misery of the unemployed, the status of the private dental practitioner should not be unconsciously destroyed.

Last January, several months prior to the publication of relevant quantitative data, it was emphasized that

> At a time when incomes are falling, individuals who under normal circumstances consult the private practitioner turn to institutions supplying the needed services gratuitously. Once people feast in the verdant pastures of free service, they are certain to return and having browsed there in times of economic misery, are likely to continue to come back after the original cause has long disappeared. The upshot of this is that sooner or later gratuitous service comes to be regarded in the nature of a right. Custom follows from the facts of experience that give rise to it. In the end this distorted sense of right germinates and blossoms into institutions supplying free services. The shift in the demand for services from the private practitioner to the free dental clinic by this process may become permanent . . . . The insidious encroachment of public health administration into the field of private practice is a movement increasingly evident and in periods of economic stress gains momentum.[1]

Statistical evidence compiled by the Children's Bureau of the Department of Labor covering the three depression years, 1929-1932, discloses a three-fold increase in the number of visits by city and county physicians to the homes of families unable to pay private doctors. At the peak, December, 1932, the number of visits was more than six times greater than the 1929 average. Figures from fifteen city areas reporting for both 1931 and 1932 show an increase of 64 per cent between these two years. While the data cited concerns medicine specifically, professional dentistry no less than medicine has faced persistent encroachment upon its professional welfare by tax-supported, politically-administered, municipal, county and state institutions.

It is the avowed purpose of Recovery legislation to increase the buying power of labor and agriculture in order that the rate of consumer-buying (of *goods*) in the market shall not lag behind the rate of industrial output. The equalization of these two rates will, supposedly, create the desired equilibrium in the economic system, and industry and trade will then move along on even-keel with no serious maladjustments. What is the size of this fund of buying-power which is to yield a buying-rate equal to the rate of output of goods? An examination of the codes thus far submitted to the Administration indicates an average wage level of $12.60 in the electrical supply manufacturing industry, $14.74 in lumbering, $14.40 in cement, $13.40 in steel, $15.00 in ship-building, and $20.00 per week in the garment trades, barely sufficient to buy the elementary necessities of life not alone the increasingly urgent medical and dental care. If these rates of income are indicative of the level of well-being that can be produced by the economic organization, then gratuitous dental care is all that several millions of workers can afford. In the short-run dentistry is faced with the dark prospect of a working population at the poverty level. This points to still further shifting in demand for services from the private practitioner to the free dental clinic.

Little responsibility can be placed on professional dentistry for the failure of the economic system to provide a decent standard of living for the population. But precisely because the profession is obliged to shoulder a large share of the burden of precarious and untried economic schemes, the quality of economic leadership from those entrusted with the affairs of government, does touch the nerve center of the present and future state of private dental practice.

In calling upon industry to set up codes, the government in substance challenges private enterprise to demonstrate what it can do now that anti-trust laws are suspended. Donald Richberg, Counsel for the National Recovery Administration declared that

> "unless industry is sufficiently socialized by its private owners and managers so that great essential industries are operated under public obligations appropriate to the public interest in them, the advance of political control over private industry is inevitable."[2]

This is the ultimate intent of the bell book and candle to revival, the Recovery Act. Under the act industrial agreements now take the force of law when approved by the President; minimum wage laws are to be universalized, but what is the economic value of minimum wage laws in a period of inflation? If an industry cannot agree upon a code, or if the agreement is unsatisfactory, the President may draft and enforce a new code for such industry.

Wages are to be raised and so are prices. Prices will be raised more than wages in those industries that are operating at a deficit according to the formula of the bill. If prices are raised more than wages, where is

*Because of the timeliness of the subject, this article by Doctor Swanish has been given the space regularly allotted to *The Dental Scene*.

[1] Swanish, P.T.: The Common Interest in Prosperity, Dental Digest, 39 : 29 (January) 1933.

[2] Cited, United States News, July 1, 1933, p 8.

the gain in total purchasing power—the very thing needed to stimulate production? Shorter hours and higher wages are urged as a means to increase employment, but shorter hours and higher wages instead of diminishing unemployment will increase it unless higher pay is offset by greater hourly output. Without an offsetting increase in labor efficiency, labor costs rise, prices rise, high-cost (non-profit) firms are eliminated, bankruptcies follow and workers are discharged. Low-cost producers are forced to economize on labor costs and proceed to discharge the least efficient workers.

Higher wages to dental laboratory workers pass on to the dental practitioner. Dental charges are based, in part on the principle of what the traffic will bear; in short, upon the patient's ability to pay. Consequently, the increased cost of laboratory service must be absorbed by the practitioner. As a consequence of inflation, the dentist must pay more in paper dollars for gold, silver, artificial teeth, and other needed materials. While fees remain constant, since they are, in most cases, already as high as the patient can afford, variable costs rise, with the result that dental incomes decline still further. The increased variable cost factor, because of higher prices plus the higher overhead cost per patient due to the decrease in the number of patients (steadily increasing number of persons seeking gratuitous dental care), cuts under the already relatively low economic status of professional dentistry.

The immediate and substantial increase in purchasing power of farmers and a planned reduction in the production of surplus crops are the ends sought by the Government as it drives forward in placing the principal parts of the Agricultural Adjustment Act into effect at once. The plan is to pay farmers rentals for retiring part of their acreage from production of surplus crops, the payment to come from a processing tax of about four cents per pound of cotton and a maximum of thirty cents per bushel of wheat or about a cent per loaf of bread if the tax is not pyramided.

The plan for cotton growers is a combination of the leasing and option scheme. The Government leases 25 per cent of the cotton acreage (about 6 million bales) at rentals varying from $6 to $12 per acre plus an option on cotton turned over by the Farm Credit Administration to the Secretary of Agriculture at 9½ cents per pound and offered to farmers at 6 cents per pound. On this transaction the Government loses $50 million at once. In effect, taxpayers subsidize farmers' gambling on the price of cotton. If the price falls below 6 cents, the option is allowed to pass and the farmer loses nothing; if it rises above six cents, the option is taken.

For the year 1933, this scheme is to cost the taxpayers $300 million on account of cotton and wheat alone. What it is to cost in the end, no one knows. Assuredly, the farm relief act is not a recovery measure. It is simply a scheme for "shifting some of the burden of the depression from the over-mortgaged and over-taxed farmer to the unemployed and underemployed city dweller." To plow already planted cotton under, is to destroy buying power. A sure way of casting recovery to the dogs is to destroy national wealth.

The Inflation Bill ignores the definite teaching of experience; e. g., monetary tampering is just a palliative which brings a lower standard of life and a general loss of savings. A lower standard of life would mean a further imposition of state dentistry on private practice.

Any examination of the forces of depression and the political measures created to bring about an upturn in industry and trade on professional welfare in the present and in the long-time, is more or less incomplete without anaylsis of the "innovation" in the present scheme of things; i. e., the establishment of federal supervision and planning. In the practical administration of a planned system, economics is invariably forced to yield to politics. The practical administrators are not infrequently chosen for their gift of getting along with men and because of their acceptability to the political group at the helm with the consequence that instead of "economic planning we get political compromise." The case *par excellence* is, of course, Soviet Russia. Experience there points definitely to the fact that in the practice of state medicine and dentistry, professional welfare plays second fiddle to the political and economic exigencies of the State. The problem before medicine, and dentistry as well is admirably summed up in the following quotation:

> But who will question that our present maelstrom of contending social forces are bent upon bettering the human race through medical and public health services without considering very seriously what the leaders of these services think as to how these ends may and may not be advantageously sought? More than anything else, at this time an authoritative voice is needed. Unquestionably such a voice should emanate from organized medicine, while public health forces should operate as a broadcasting service, corroborating, interpreting and demonstrating the possibility of a plan of administration which recognizes the fundamental soundness of conserving the welfare of medicine as secondary only to the welfare of the human race."[3]

So far as the body economic is concerned, it is highly probable that its failure to produce a standard of living compatible with ordinary decency can be traced to the fact that even the man on the street regards himself competent to write and administer the prescription for the economic afflictions of a complex economic society. As for dentistry the presumption is invincible that the most effective prescription for the preservation of health as it is affected by stomatologic conditions can and should be written by dentists rather than by politicians. It must be written and made articulate by the authoritative voice of the entire profession.

[3]Baker, J. N.: United States Daily, volume 8, number 68.

WHY DENTAL CARIES WITH MODERN CIVILIZATIONS?

VI. PRACTICAL PROCEDURES FOR THE NUTRITIONAL CONTROL OF DENTAL CARIES

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IN THE five preceding communications reports have been given of field studies conducted in Switzerland and the Outer Hebrides which consisted of an interpretation of clinical and chemical data. In this communication data are given on the practical application of the information developed in these investigations of the problem of the control and prevention of dental caries and associated degenerative processes.

It is important that some of the general physical differences be observed in two groups, one reared on the kind of nutrition used by its ancestors, and the other reared on the nutrition provided by modern civilizations which is almost universally attended by dental caries and often in severe form.

In Fig. 1 will be seen a group of girls and boys who live in the Kyle of Scalpay, Isle of Harris in the Outer Hebrides. Their nutrition has consisted largely of oat products and sea foods as previously outlined. Their physiques are excellent and they have a very high immunity to dental caries. The symmetry of the arches is relatively perfect, the nostrils broad and the middle third of the face is well developed in proportion to the remainder of the face. In this group only one tooth in each one hundred teeth examined has ever been attacked by dental caries. In the June installment of this series I compared the incidence of tooth decay in this group with those of Tarbert about ten miles distance in which 32.4 teeth out of every hundred examined had been attacked by tooth decay. Tarbert, it will be recalled, is a port with access to modern foods and has a modern bakery.

In comparison with Fig. 1 one sees at once on studying Fig. 2 that in all of the children in this group of four photographed on the Island of Bardsey off the northwest coast of Wales, where they were living on modern foods and were suffering a definite and serious lack of development of the middle third of the face, tooth decay was rampant—27.6 teeth out of every hundred teeth examined among the growing boys and girls had already been attacked by caries. Even children 3 years of age were found with tooth decay. It will at once be seen that these children have already suffered a handicap that cannot be estimated nor can it be entirely overcome. All of these children are mouth breathers. This greatly increases the predisposition of infection of the air passages and to disease in general. All of these older children have rampant tooth decay and accordingly focal infection with its resulting suffering and injury. Irregularities of the teeth are common accompaniments to the type of facial deformity present in this group; mastication is also interfered with and accordingly digestion is disturbed. They are partly doomed before they have gone far on life's journey since they cannot hope to compete with the physically fit. I have referred to the fact that this island was largely repopulated less than a decade ago.

Fig. 1—A group of children in the Outer Hebrides, reared on primitive foods. Note the splendid facial development. They have high immunity to dental caries.

In the technical textbook to which this series is complementary I have discussed the mechanisms that are involved in this deformity and traced its cause directly to the absence of activators and minerals in the foods.

It can readily be anticipated how these two serious disturbances of dental caries and facial deformity can occur in the same persons as parallel symptoms of a common group of causative factors, all of which are to be found in the food intake. It impresses one profoundly who has been trained to study faces critically to note the striking differences in the physiognomies of two groups of the same stock separated by only a few miles in physical distance but living on different nutritions. In one group were found large numbers of persons with irregular teeth and serious facial deformities urgently needing the services of orthodontists. In the other group in practically no case was there need for the orthodontist's services among those receiving an adequate nutrition of minerals and vitamins.

If the data I have presented are correctly interpreted as indicating that white flour products and the foods that are associated commercially with them so distinctly lower the ef-

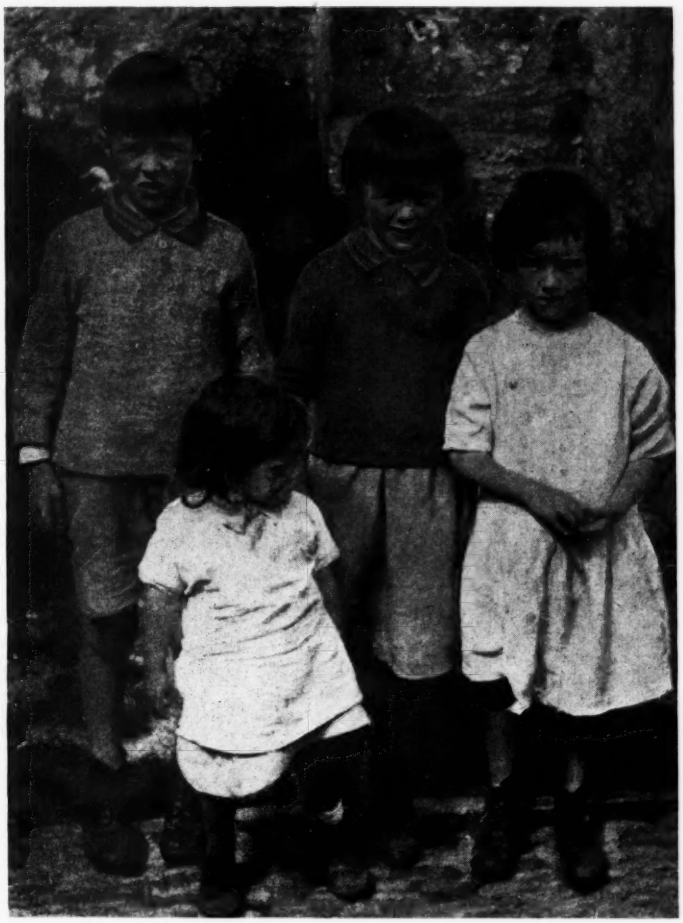

Fig. 2—These children of the Isle of Bardsey had modern foods and active caries. All are mouth breathers. Note the lack of development of the middle third of the face.

fect of the body factors that provide defense and immunity, it should be possible to produce different effects in animals by simply modifying the nutrition in the general way that I have outlined. In order to study this phase of the problem I presented in my paper before the American Dental Association meeting at Buffalo, September, 1933, the results of placing fifteen pens of rats on fifteen diets that are similar in all respects except the form and kind of cereal products used. Three of these modifications of nutrition are shown in Fig. 3 in which will be seen a comparison of the distribution of the minerals of the cereal part of the ration when different forms of wheat were used; associations and comparisons were made with the physical development of the rats. The three forms of ground whole wheat used were whole wheat, white wheat flour, and bran and middlings mixture. In the first column it will be noted that the rat that has been feeding on the entire wheat product in connection with the stock diet which was the Mellanby[1] ration as modified by Hoppert, Webber and Canniff[2] and which consisted of cereal 66, whole-milk powder 30, alfalfa meal 3, sodium chloride 1, is in excellent physical condition and is much larger than the other two. The one in the center receiving the white wheat flour as the cereal part of the ration has shaggy hair, is extremely nervous, underdeveloped and emaciated. The third rat receiving the bran and middlings mixture while much better than the second lacks a great deal of being equal in physical efficiency to the first rat. While there was a decided difference in the physical appearance the difference in the nervous reaction was even more striking. The rats fed entire wheat were active, had good disposition and could be handled even roughly with impunity. The rats of the second group were irritable and nervous, even treacherous. They would jerk involuntarily at a mere snapping of fingers in front of the cage. The rats in the third group were listless, undersized and evidently subnormal when compared with the rats in the first group.

Since all factors in the nutritions were the same except the cereal factor it is important to note some of the principal differences in the mineral content. The phosphorus content of the ration of the group receiving entire wheat was 0.97 as compared with 0.16 in the rats fed the white flour. The mineral content of the group receiving the bran and middlings mixture while higher than for the rats receiving entire wheat did not produce so good a physical efficiency as the entire wheat product.

In the extended text I have prepared I present the chemical analysis of the blood of these various groups of rats in comparison with one another and note those characteristics that were most significant in association with the diets used. It is important to note that the activator other than that in the cereal was the same for all the animal groups and also that the calcium content of the cereal did not differ greatly in these three groups while the phosphorus markedly differed in the white flour group.

If the data I have presented in preceding research reports and in the communications preceding this in the DENTAL DIGEST are correctly interpreted, it should be possible to modify the severity of dental caries in any group of human beings or experimental animals. It should also be possible to prevent dental caries or even check it if already active by the addition to the nutrition of the affected group of those substances present in the food of the immune group. I have interpreted these variations to be related to a difference in the quantity of fat-soluble activators in the nutrition and a difference in the quantity of minerals, chiefly phosphorus, and also in the chemical form of the minerals, particularly phosphorus. This is not a new or recent procedure for me because it has been a progressive development and in continued successful operation since 1922, and under study for five years previous to that date with regard to its being related to radiant energy and its products. I have published many reports in the meantime showing progress in the development of this phase.

At this time the practical application of this procedure by the selection of rampant cases of dental caries among children in two missions of Cleveland will be discussed. I have selected these children on the basis of the urgency of their need as indicated by the extent of dental caries and evidence of its activity. Three clinical groups have now been run in Cleveland, two in the same place during two different years. There are two groups in the Broadway Mission and

[1] Mellanby, May: Diet and the Teeth, Brit. J. Dent. Science **64**: 70-81, 1921.

[2] Hoppert, C. A.; Webber, P. A., and Canniff, T. L.: The Production of Dental Caries in Rats Fed an Adequate Diet, J. Dent. Research **12**, February, 19:2.

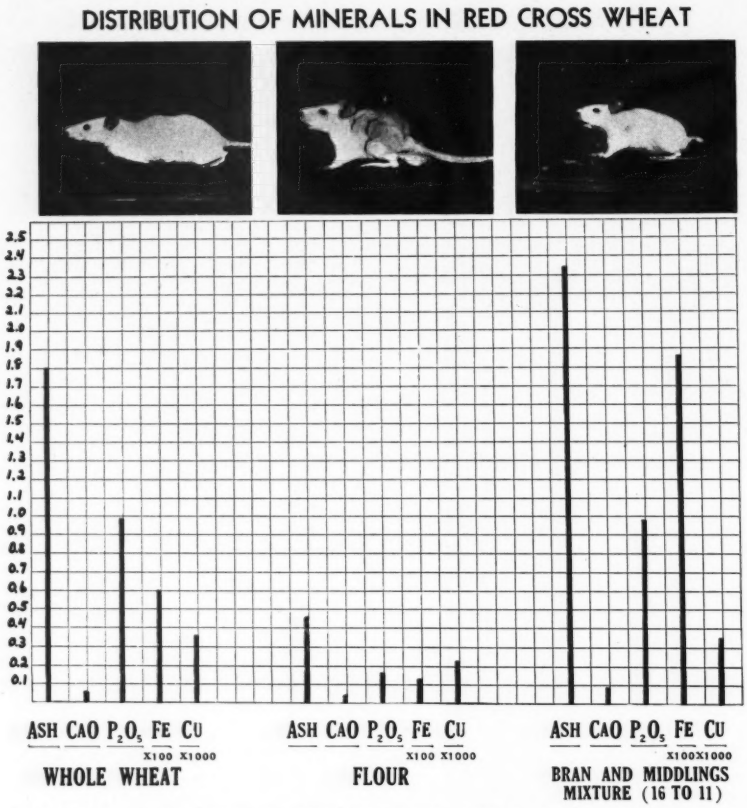

Fig. 3—The nutritional effects produced by three diets differing only in the wheat product factor of the ration. Note the marked difference in the chemical content of white flour and whole wheat, particularly in the phosphorus. The middle rat on a flour diet had dental caries.

one in the West Side Community House. In the former place the selected group received as special reinforcement one meal a day for six days a week for about four months of the winter and spring, from February to June, 1932. The present group in this institution receives similarly one reinforced meal a day for six days a week from November to June, 1933. The group at the West Side Community House received one reinforced meal a day for five days a week from March 30 to July 1, 1933. Wherever possible the children selected had cavities in which the decalcification extended to or near the pulp as evidenced by the roentgenograms but the teeth were known to be still vital. Pulpless teeth were extracted. Similarly the teeth with serious pulp involvements were extracted. As an experimental procedure many teeth were retained in which there was little possibility that the pulps could be prevented from progressive degeneration ultimately requiring the extraction of the teeth.

A considerable number of the teeth were purposely left without restorations, particularly those in which there was no danger of mechanical pressure causing pain or injuring pulp tissue. In my hundreds of clinical cases extending over the past decade, it has frequently been noted that hypersensitive teeth rapidly lose their abnormal sensitivity and become normally comfortable. In many cases in which the decalcification had approached the pulp the odontoblastic layer of the pulp had been induced under the nutritional program to lay down a protective layer of new dentine at the point where dental caries was approaching. This, however, was done on three reinforced meals a day inasmuch as the instructions regarding the selection of the nutrition involved all the meals and the activators were used in all three meals. In these three groups neither the children nor their parents had instructions as to what to eat during the other fifteen or sixteen meals of the week which they had at home nor did they have any special reinforcement of vitamins or activators to use with home meals.

The quantity of activators given in the one meal a day was approximately that which would ordinarly be distributed through three meals but it would not be possible similarly to increase the food eaten during the meal since presumably children would eat until their hunger was satisfied at each meal. An effort was made, how-

Fig. 4—Four stages representing caries of the lower first molar. Note the new protecting wall of dentine built over the pulp as a result of a special nutritional program.

ever, to select the foods for the special meal so as to provide a reinforcement of the minerals, particularly by the addition of the factors that are present in liberal quantities in the foods of modern civilizations. Specifically, this consisted of changing the white bread products to entire cereal products, thus reducing the calories content in proportion to the mineral and activator content and providing every day one of the natural sources of the fat-soluable activators that are available for the primitive group.

Roentgenographic studies were made in all cases of molars and bicuspids and in other teeth in which caries had occurred. Samples of saliva were taken for chemical analysis, detailed records were made of the positions of the cavities, height and weight and general physical conditions and special factors were recorded with each case, including photographs of the face in special cases. Additional roentgenograms are made on an average of every sixty days to check the change in the dental conditions, particularly for comparison with earlier and later records.

A typical striking illustration of what has occurred is seen in Fig. 4 in which is shown four views of the same tooth enlarged to reveal the detailed structure of the interior of the teeth and the supporting bone. It will be seen in the first view that the decalcification had apparently reached the pulp. The débris was removed by washing and such of the carious matter as could be dislodged easily without danger of exposing the pulp was removed by instrument. As in such advanced cases of dental caries a protective temporary restoration was placed to protect the pulp. It will at once be seen that in the period of thirteen months between the first and last views the pulp has laid down a well organized layer of dentine providing complete protection. There is no doubt that this procedure continued to make this tooth fit for service. However, it is important to consider what might happen if the service was not continued.

The change that occurred during the period that the child was given the reinforced nutrition is illustrated in the difference between the first two views which represent this period. The first roentgenograms were made on March 5, the second on July 12, 1932. The nutritional reinforcement was discontinued during the summer and was not taken up again in the fall partly because the patient moved to another community. It is of interest that the reparative process progressed favorably beyond what it was in July as evidenced by the roentgenograms made on December 17, 1932. Another roentgenogram made on April 22, 1933, shows little change in the extent of the new wall of dentine built over the pulp. However, the decalcification that had begun on the proximal surface and had become inactive has now become active so that a new cavity is developing in this tooth because of an inadequate intake of something that had been made adequate during the early period.

Several cases of this type are shown in Fig. 5 in which the following details should be noted: In number 1 is shown a carious cavity with decalcification extending close to the pulp. In the second and third views there is disclosed a progressive decrease in the size of the pulp chamber with a progressive thickness of the zone of protection and an increased factor of safety for the preservation of the pulp. This total change has occurred in six months under the nutritional program.

In number 2, eleven months later, the first four months of which the patients were on the special defensive program. The condition is similar to number 1.

In number 3 the occlusal caries had decalcified to the distal horn of the pulp. Nature has built in a protecting zone as well as mineralized the decalcified dentine such that in five months an excellent factor of safety has been established. In the first and third cases protective temporary restorations were placed to prevent pressure from disturbing the pulp.

In number 4 no protection was used and it will be noted that the caries has not extended in the six months while on this nutritional treatment and a fine zone of protection has been built over the pulp with an increase in mineralization of the entire tooth including the decalcified dentine.

Numbers 1, 3 and 4 are in the group receiving a reinforced nutri-

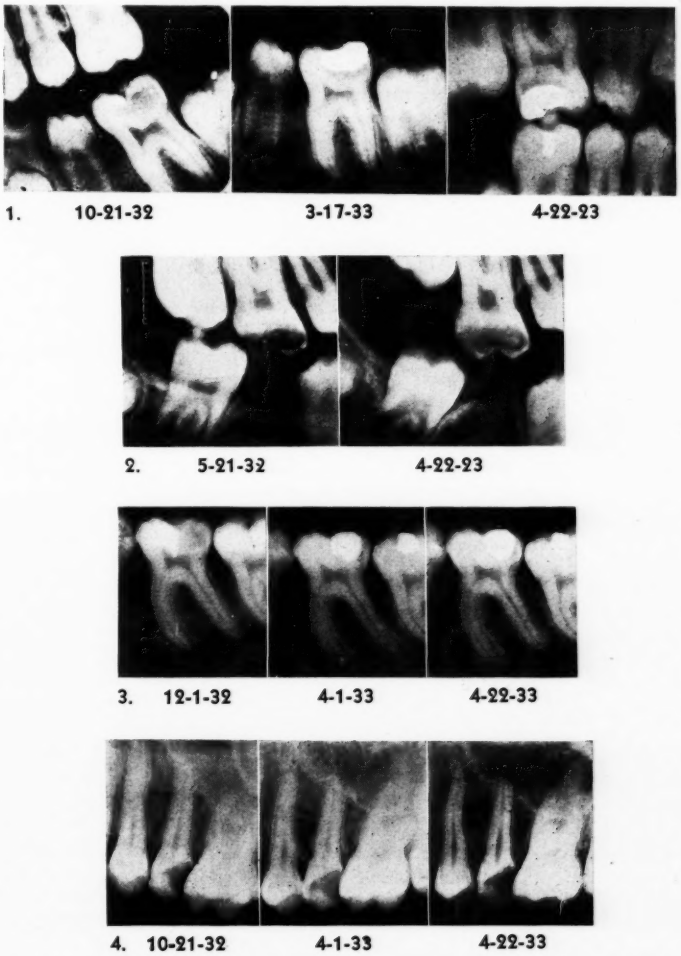

Fig. 5—Typical examples of the building in of a protecting wall of new dentine within the pulp chambers and the mineralization of decalcified dentine under nutritional treatment for the control of tooth decay.

tional program from November, 1932 to June, 1933. Number 2 was in the group that received a reinforced nutritional program from February to June, 1932.

It was gratifying to see the appreciation of the children for the benefit they were receiving from this nutritional program. They seldom missed a meal and many of them changed from being children difficult to manage to affectionate and cooperative boys and girls under the direction and efficient supervision of Miss Ruth Flaherty.

The physical changes that occurred in these children were marked. There was a general gain in weight and in growth. In the first group eight children gained on an average of 7 pounds each in fifteen weeks. Most striking of all was the difference in their dispositions and sense of well being. One boy gained 7 pounds in four weeks. He had been a frail invalid owing to lack of nutrition and it was a question whether he should walk the two blocks to come to the mission for his meal. In a month he was able to play basket ball and he soon played as hard as the other boys.

The improvement in school work was so striking that on two occasions teachers came to me to inquire what I had done to create so marked a change in the children who had progressed from among the poorest in the class to the best. In my private practice one boy's grades improved from 55 in mathematics to 97 and there also was an excellent change in his physical well-being and general disposition.

The following is the nutritional program provided:

As the children come from school to the church for their noonday meal for six days of the week they line up and take from a spoon a mixture of half and half high vitamin butter concentrate and high vitamin cod liver oil. The butter vitamin concentrate was chiefly made from butter produced by cows fed a rapidly growing wheat or rye. The quantity of butter vitamin concentrate taken is usually 4 cc. daily and in some instances 6 cc. (One teaspoonful is 4 cc.) This was followed by fruit or tomato juice. They then proceed to the table to eat a luncheon in which the fluid parts are largely milk or the juices of meat and vegetables. On some days is served a pint bowl of a thick vegetable soup and meat broth made from bones and meat into which is added not the meat in which the material had been cooked but some chopped fine grade meat that has been broiled in the pot to retain all its nutrition. The vegetables are selected on the basis of mineral content as outlined in detail in my textbook. In addition, a cooked fruit, not highly sweetened, and special entire wheat muffins are served. The muffins are spread liberally with high vitamin butter produced from cows pasturing on rapidly growing young wheat and rye. Each child drinks a pint of milk with each meal. The children are allowed as many helpings as they desire.

The fat-soluble activators in the form indicated and the high vitamin butter are furnished by me. The other foods are provided by a special fund under the management of the church staff. The concentrate was prepared from the best butter products that could be found in various parts of the country and some from other countries.

It is of interest in this connection that over 75 per cent of all the butter that I have found to be sufficiently high in vitamins for my use has had to be shipped a thousand miles or more and often duty must be paid as well as expressage. This as I have shown in my textbook is entirely unnecessary since the product can be produced in any place with the proper nutrition of the cattle. The ration of butter alloted provides an adequate supply of vitamins for twenty-four hours and usually approximately enough minerals to carry the child through the day while supplying both the energy and reparative factors.

The striking effects obtained in some cases by this procedure is shown in the two following cases: I was called on the telephone one day by the Reverend Edwin A. Brown, Pastor of the Broadway Methodist Episcopal Church which is located in a mission district. A large number of the workers in that vicinity are engaged in the steel mills which have been shut down during an extended part of this industrial depression. The Reverend Brown reported to me that he had just been called to a home to baptize a small child for burial and while he was extremely ill with a broken leg that had not united and was suffering from repeated convulsions, the Reverend Brown believed that the child might be saved. He thought the cause was largely nutritional and asked if I would see the child. He was a frail little lad, aged 3 years, and had had his leg in a cast about two months. The convulsions were becoming progressively more severe and more frequent and had already extended over a period of six or eight months. The child was carried by his grandmother on a pillow on the back seat of an automobile to the office. He had broken his leg as he fell during one of his convulsions while walking across the kitchen floor. The boy had been living on bread and milk. Ordinarily, bread and milk is considered a pretty good diet. Had he been getting bread and milk in the Alps in the communities in which I found high immunity to dental caries he would not have had this accident, but he was living in a modernized, so-called civilized community. The bread he was eating was white bread and the milk was skimmed milk.

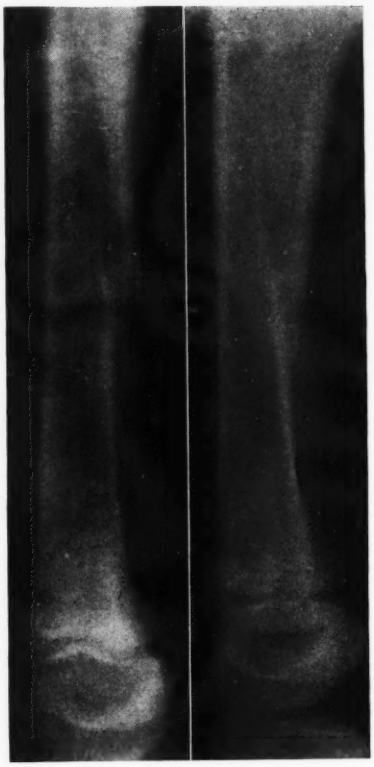

Fig. 6—Healing of Ununited Fracture in thirty days with the aid of butter vitamins.

It is important to note that the calcium and phosphorus are as high in skimmed milk as in whole milk; however, this child's body could not maintain the minerals in the blood on this nutrition and he was compelled to borrow from his skeleton, thus undermining his bones from the inside. The only changes that were made in his diet were the following:

The child was fed rolled whole wheat which I keep on hand to give to patients (not for sale) as a part of an educational program. They are taught several ways of using it. The instructions to the boy's grandmother were to cook the cereal for a couple of hours in a double boiler with plenty of water, five or six times as much by volume as was used of the cereal.

This was to be strained through a piece of cheese cloth to take out the coarse bran if it was found to be irritating. Muffins were to be made a little later of the same material, some of the cooked cereal to be used as a binder instead of a white flour binder. The child was to have all the whole milk he could use and in addition have put into his milk each time it was served to him warm some of the high vitamin butter concentrate which I gave them in little vials. Some of this butter concentrate was also to be put over his porridge. It was of interest that the boy has not had a single convulsion since he took his first meal, immediately on his return home, containing this high vitamin butter concentrate and fresh whole milk which the Reverend Brown had supplied to him every day. In one month's time the broken femur was united as shown in Fig. 6. The roentgenogram was made thirty days after the boy started on this nutritional program and after the removal of the cast. The view shows the bone condition both before and after treatment. Dental caries which had been rampant ceased to be active.

About sixty days after the boy was first brought to me the Reverend Brown called at his home to see how he was progressing and his mother stated that he was in the yard playing. They both went out to find him but because he was afraid he was to be punished for something he ran and climbed over the back fence. He had had an attack of infantile paralysis in infancy which was largely blamed for the symptoms he later developed but apparently have been outgrown. This boy is a brother to the one whose teeth are shown in Fig. 4. They are two of a large family. The mother's teeth were wrecked with caries for clearly she had to pay the price of frequent pregnancies and poor nutrition. She, too, was provided with additional vitamins since another pregnancy was in progress. On measurement she asserted that she had lost 4 inches in height during her periods of child-bearing.

Another case that illustrates an important problem that is associated with modern civilization is arthritis. As I have previously noted, I found its occurrence rare in the communities with high immunity to dental caries both in the Outer Hebrides and in the physically isolated districts in the Alps. This is in strong contrast with an American mountain community where modernized living conditions have been in use for many generations. In one of the eastern states of the United States I found a community where every fifth house had a severe case of arthritis. Arthritis is usually associated with adults, particularly with the aged. In that community I found children bedridden with arthritis as I made a door to door inspection in studying the nutrition and its effects. The case reported here is in an adjoining state.

The mother solicited my assistance, reporting that her boy, aged 5 years, had been in bed most of the time, in hospitals for two and a half years with rheumatic fever, arthritis, and acute heart involvement. She reported to me that she had been told that her boy could not recover, so severe were the complications. She requested that if that is true she be privileged to take him home and enjoy him as long as he lived since he was her only comfort. As is so generally the case with children with rheumatic fever and endocarditis, this boy had suffered severely with rampant dental caries. It is important to keep in mind that

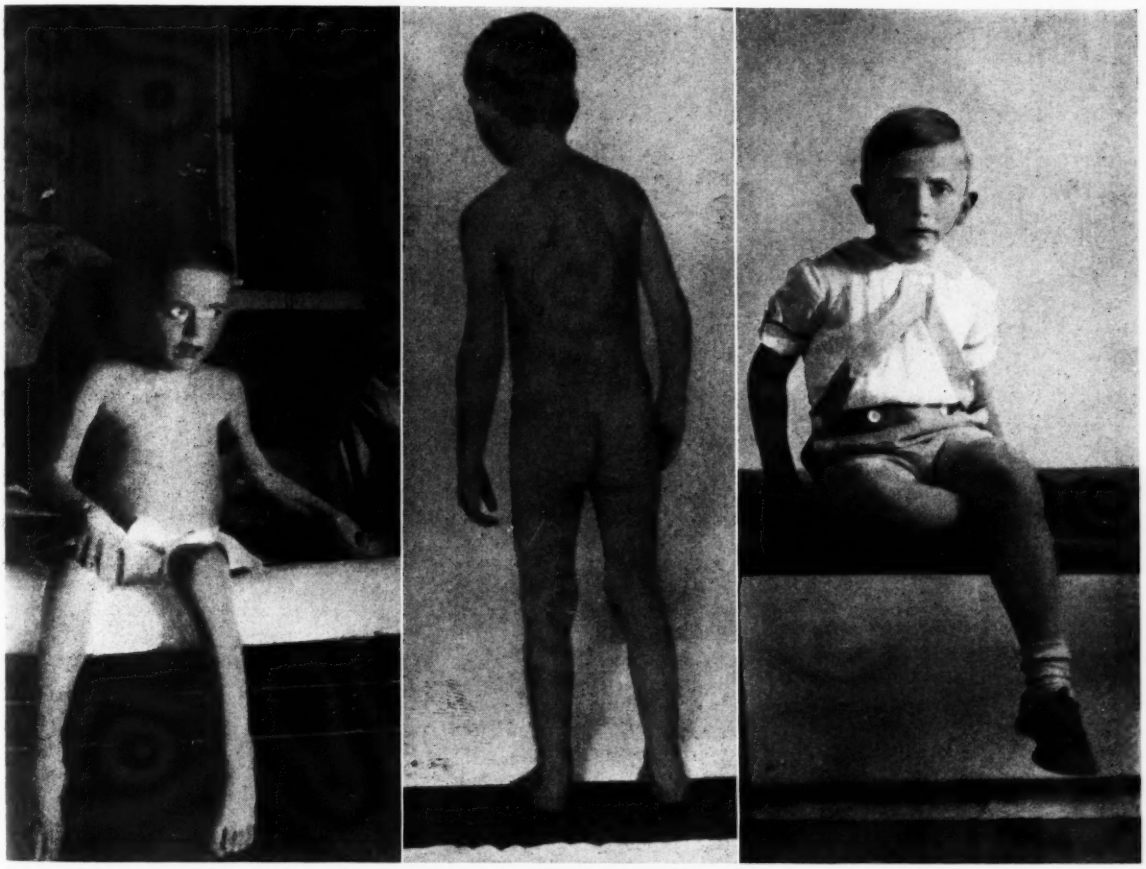

Fig. 7—Multiple arthritis and heart involvement following rheumatic fever. Approximately six months elapsed between first and second and second and third views.

according to the data of the American Heart Association 75 per cent of all cases of heart involvement begin before 10 years of age. My studies have shown that in more than 95 per cent of these cases there is active dental caries. This case was typical in this regard. In addition to the nutritional factors outlined in the previous case reported, the mother was provided with a rubbing oil for the affected joints. This consisted of the same material that was in the capsules with the exception that it had been exposed for ten minutes to sunshine in an open dish as an activating process. The fat-soluble activators were given as a mixture of high vitamin butter concentrate and high vitamin cod liver oil in equal parts. This was placed in naught size capsules of 0.6 Gm. in each. The boy took three of these capsules with each meal. His nutrition consisted chiefly of entire grain cereals freshly ground and entire grain breads, a liberal use of whole milk supplemented with vegetables and fruit with fish and a limited amount of sweets. This patient is shown in Fig. 7.

It is difficult to realize the great change in the physical condition which occurred. The distressing and acute pain rapidly subsided; the boy's appetite improved; he slept soundly and gained in weight rapidly. In the first six months he had changed to the condition shown in the second view and in the second six months to the condition shown in the third view. The ankylosed condition of the spine, including the neck, has cleared, and the boy has full use of his hands, legs and feet.

In the light of our newer knowledge as illustrated by these investigations which include a large number of cases of arthritis, several of which I have previously reported, it seems clear that skeletal degenerations as expressed in arthritic processes are often largely and probably always in part due to mineral metabolism disturbances which have their origin largely in nutritional deficiency. It is easy for focal infection from teeth, tonsils, or any other source, including epidemic infection, to become planted in the joints where an abnormal state has been established through nutritional stress. Indeed, many of the disturbances in the soft tissues as so-called organic diseases, including heart involvement, such as endocarditis, may have the soil prepared in large part by a disturbance in activator and mineral intake.

As I dictate this, the data are just coming through on a second blood test for a woman, aged 72, who has been another of the unfortunate elderly people to have a broken hip. She is in a hospital in another city and when my assistance was solicited by the physician in charge of the case, his prognosis was bad since there was already a rise in temperature, the patient was coughing and the dread pneumonia that so often involves these cases was greatly feared. A chemical analysis of the blood and saliva showed chemical factors that would preclude the possibility of healing fractured bones. A check on the saliva in ten days after the new nutritional program was established shows a remarkable improvement. Another sample of blood has been brought one month after the first and the patient's physical improvement checks with the improved blood picture for now she and all concerned are hopeful and confident of her recovery. Her physician and her son both report that she is physically in better health now than before her accident. Pain was relieved rapidly.

The Etiology and Control of Dental Caries

Text for a book of 125,000 words by
WESTON A. PRICE, D.D.S., M.S., F.A.C.D.

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5. Seasonal Tides in Vitamin Levels in Dairy Products.
6. Evidence of a Relationship Between These Degenerative Diseases, Low Vitamin Foods and Soil Mineral Deficiencies.
7. Some Physical Expressions of Nutritional Deficiency.
8. Early Clinical Evidence of Caries Control by Fat-Soluble Activators.
9. Some Blood Chemical Expressions Associated with Disturbed Mineral Metabolism.
10. The Experimental Basis for a New Theory of Dental Caries.
11. Laboratory Evidence Supporting This New Theory.
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13. Supporting Evidence from Field Studies in Each District Providing High and Low Immunity. (Switzerland, Hebrides, Alaska, Canada, Central America.)
14. Diets of the World in Relation to Dental Caries.
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20. Light from the Activators on the Phenomena of Life.
21. Some Special Chemical Procedures for the Analysis of Blood, Saliva and Urine.
22. Some Chemical and Physical Procedures for Selecting Foods and Activators.
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24. Practical Procedures in Diagnosis and Treatment for the Control of Dental Caries.
25. A World Program for the Control and Prevention of Dental Caries.

The following will illustrate the changes:

The product of calcium and inorganic phosphorus of the blood serum which is normal at about 40 and which for normal repair of bones should be at or above 40 was in the case just cited down to 17.3. It is exceedingly difficult if not impossible for broken bones to unite if this factor is below 25. In one month's time this factor has changed to 28.9. The inorganic phosphorus of the serum was at 1.75 and this has increased to 3.03. Similarly, the solubility factor of the blood for phosphorus was previously abnormal, such that whereas the inorganic phosphorus of the blood serum should normally be decreased in the presence of powdered bone by a process of absorption, in this case it was seriously abnormal. The inorganic phosphorus passed from the powdered bone to the blood serum to an amount equal to 46 per cent of the serum inorganic phosphorus. This factor has changed so that now 17.5 per cent of the inorganic phosphorus of the blood serum passes to the powdered bone. This makes bone healing favorable. The following changes have occurred in the saliva. Before treatment the inorganic phosphorus of saliva passed from the powdered bone to the saliva to an amount of 13 per cent which is in the wrong direction and in ten days moved liberally from the saliva to the powdered bone by a process of absorption.

While this series of articles herewith concluded has been in process of preparation and publication, the material has been almost completed for a textbook in which the discussions are more technical than in this series and in which probably most of the questions prompted by the reports of these investigations have been answered. Fortunately, Nature has provided us a magnificent control in this big human experiment in that the primitive people of many lands have been relatively immune to dental caries until they have been reached by modern civilization and its commercial foods. While this is being put in type I will be searching for bands of primitive Eskimos and Indians in Northwest Canada and Alaska to learn their lessons to help us with our problems. These field investigations will include studies of the chemical characteristics of the blood and saliva and their relation to the level of immunity to dental caries and other degenerative processes, such as irregularities of the teeth and facial deformity and arthritic processes. These blood and saliva studies will be compared with more than 2000 blood analyses of persons in modern civilizations and nearly an equal number of saliva analyses for modernized subjects.

It is important that these new principles be made available for practical application as rapidly as possible. For this purpose I have prepared data for a textbook including the following: detailed procedures for diagnosis and treatment, chemical procedures for analysis of blood and saliva, testing of foods, their preparation and selection of high vitamin products, and details for clinical application. The text is designed to anticipate the scientific and practical needs of dentists, physicians, and other health workers.

Dental Research Laboratories
8926 Euclid Avenue.

FRACTURE OF MAXILLARY TUBEROSITY CONTAINING AN UNERUPTED MOLAR

M. HILLEL FELDMAN, D.D.S.
New York

THAT a maxillary tuberosity may fracture during the removal of a third molar is frequently manifest. For a fracture to attend the removal of a second permanent molar is not so frequent. In the accompanying roentgenogram is seen the fracture caused by a referring dentist who had no preoperative roentgenologic knowledge of the presence of an unerupted third molar within the tuberosity.

The dental profession, it must be admitted, is still far from accepting the absolute importance of preoperative roentgenographic examinations for all extraction operations. Too much emphasis cannot be placed on this phase of practice. In the case referred to had the dentist known that a third molar was buried in the bone, weakening the structure of the tuberosity, he would not have encountered the unfortunate result shown in the roentgenogram.

Roentgenogram showing fracture of the maxillary tuberosity.

Preoperative roentgenographic examination should become an absolute requirement of sound dental practice.

730 Fifth Avenue.

The Editor's Page

UNDER the provision of the National Industrial Recovery Act the employers of labor are asked to enter into a voluntary agreement with the Government for the five-month period, August 1 to December 31, 1933, to establish minimum wage and maximum hour scales. Industries through their trade associations are given until September 1 to submit codes. If such codes are not acceptable the President has the authority to compel industry to accept his codes. Furthermore, industries agree not to levy profiteering prices as the result of such agreement and "not to increase the price of any merchandise over the price on July 1, 1933, by more than is made necessary by actual increases in production, replacement, or invoice cost of merchandise. . . ."

The Recovery Act must be looked upon as a heroic measure to revive business. The economic situation demands vigorous action. Whether this particular plan is the most effective is another point. For the present, until the expiration of the five-month experimental stage, we should withold criticisms and make every effort toward complete cooperation. Sabotage and counter-propaganda, the slacker and the objector, are as dangerous in this situation as in war time. We must accept the conditions of the present as being analogous to the conditions of warfare.

Because we are keenly interested in the conditions of professional practice under the N I R A we asked a well known economist, Peter T. Swanish, Ph.D., to prepare an unbiased, nonpartisan analysis of the measures. This analysis is published elsewhere in this issue. Doctor Swanish is well qualified to present the subject because of his wide training in general economics and practical economics, and from his experience in the dental field. He is the head of the department of economics at Loyola University, Chicago; he has been engaged in labor arbitration; he made the study of dentistry in Russia for the Committee on the Study of Dental Practice of the American Dental Association.

Although the President's Reemployment Agreement authorized by Section 4 A, N I R A specifically states, "the maximum hours fixed shall not apply to registered pharmacists or other professional persons employed in their profession; nor to employees in a managerial or executive capacity who now receive more than $35 per week," the profession of dentistry will be definitely if indirectly affected. Workers in the dental industries, laboratory technicians, and dental assistants are included within the provisions of the Act. The result will be that the production costs of dental services will be increased with the scant likelihood that the increased costs can be transferred to the dental patient.

Swanish states this point thus: **As a consequence of inflation, the dentist must pay more in paper dollars for gold, silver, artificial teeth, and other needed materials. While fees remain constant since they are, in most cases, already as high as the patient can afford, variable costs rise, with the result that dental incomes decline still further. The increased variable cost factor, because of higher prices plus the higher overhead cost per patient due to the decrease in the number of patients (steadily increasing number of persons seeking gratuitous dental care), cuts under the already relatively low economic status of professional dentistry.**

If the values in medical and dental care are to be preserved it is fundamental that such professional services be kept under the control of the professions. Governmental supervision, political domination, insurance company control—would sound the death knell of scientific and technical medical and dental progress in the United States.

We respectfully urge that the incoming administration in the American Dental Association establish a vital Bureau of Dental Economics to analyze the trends in professional practices and to protect and defend us against economic zealots of the "left wing," political demagogues, and avaricious health insurance schemes.

Economic and social philosophy in the United States is undergoing a marked transition in the clear direction of socialization. Because medical care in all its aspects is so closely integrated with human life and values we may logically expect "rugged individualism" in professional practice to be in part superseded by socialization. Furthermore, the *laissez faire* principle in economics is breaking down before a planned economic order. In a planned social and economic state the adequacies and the costs of medical care, being vital to the needs of the people, will receive close attention. It is for the members of the professions to do the planning and direct the part that they will play in the new order.

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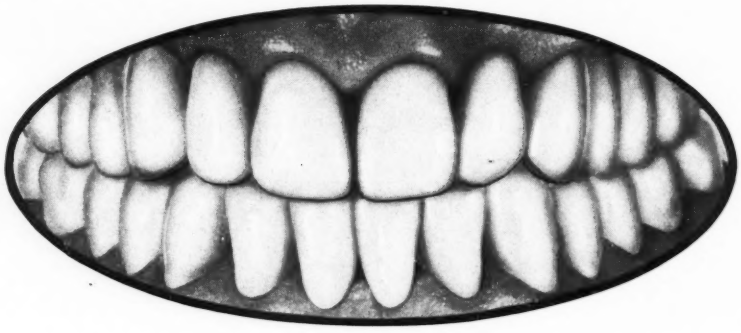

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LETTERS TO THE EDITOR

THE DENTAL DIGEST represents to my mind the greatest accomplishment in the field of dental publications the world over, and you will in time to come probably have a good many followers in various countries. The highly important feature about your publication is the essentially practical assistance which it represents to the average dental practitioner in his everyday work, and to have brought this valuable help to the dentist's office in such an attractive and artistic form is indeed an achievement of which any publisher may well be proud.—R. HENRY-WAETJEN, *Publisher of Le Semaine Dentaire, Paris.*

Your issue of THE DENTAL DIGEST this month is a masterpiece.—PETER A. FRANK, D.D.S., *Paterson, New Jersey.*

Your magazine is so valuable to me that I do not like to miss a single issue. I am satisfied and greatly impressed with the January issue. The cover is very good and the contents are interesting.—JESUS R. BARROMEO, D.D.S., *Negros, Philippine Islands.*

We have been and are regular subscribers to the new DENTAL DIGEST and wouldn't be without it. The magazine is all you promised and more.—GEORGE C. SMAHA, D.D.S., *Grand Island, Nebraska.*

The new DENTAL DIGEST is certainly a *hummer.*—A. A. ROBERTSON, D.D.S., *Marlow, Oklahoma.*

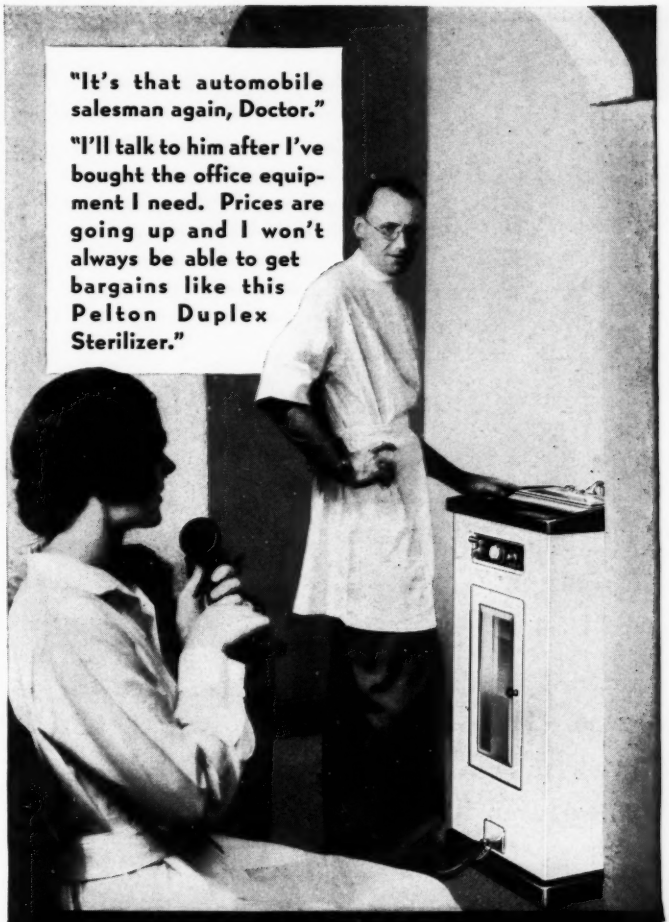
This magazine has a wonderful way of describing and illustrating, even in color, just what you want. Good luck to you.—DOCTORS FARRIER & FARRIER, *Clarksville, Texas.*

I am enclosing herewith Canadian money order for a binder for 1932 DENTAL DIGEST. I look forward with a great deal of pleasure to receiving THE DIGEST each month. Your plan of extensive illustration is to be highly commended. One article alone on impaction has been worth a great deal to me.—H. B. LEGATE, D.D.S., *Owen Sound, Ontario.*

Best dental publication of its kind. Has made me a better dentist. Keep it coming. Here are two bucks.—FRED T. JOY, D.D.S., *Franklinville, New York.*

I am forwarding a check for two dollars for this year's DIGEST. Your DIGEST was one of the biggest pleasures I had last year; I waited patiently for the new issues.—JOHN E. REINBOLD, D.D.S., *Chilton, Wisconsin.*

Like most dentists I had to be shown how good DENTAL DIGEST was going to be before I bought. Now it so happens that I would like to have all the copies bound as advertised in DIGEST and I don't have all the last year's copies. Will you be kind enough to let me know how I can secure all last year's copies and a binder for same; also a binder for the coming year?—L. H. SAMARTINI, D.D.S., *Cleveland.*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The Return of BROTHER BILL!

Perhaps the most popular dental magazine feature ever printed was the serially published BROTHER BILL'S LETTERS. As many of you will recall, the LETTERS ran in the old Dental Digest.

Reprinted in book form, a total of more than 30,000 copies were required to meet the demand. And the only way you can get a copy now is to buy it from another dentist.

Before Brother Bill came along, it wasn't professionally safe to talk about the *business* of practicing dentistry. One was liable to be excommunicated. So Brother Bill wrote some letters out of his experience to others having similar experiences.

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Now Brother Bill is writing again! He is writing about dental practice problems as they exist *today* in far too many offices. His counsel is timed to the present hour.

His first letter appears next month, in

September ORAL HYGIENE

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DANGERS IN SOLDERING

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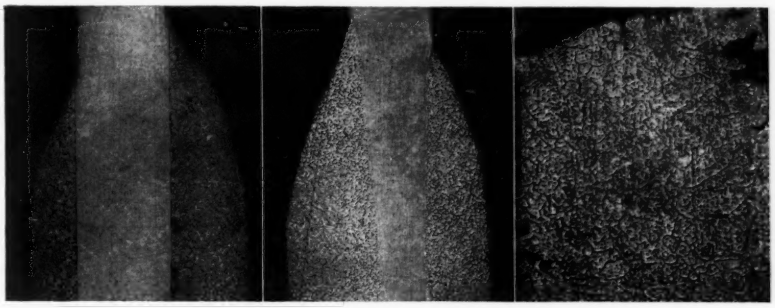

Left—Section through soldered wire showing no appreciable solution of wire in solder. As soon as the solder flowed the flame was removed. Center—Same wire and same solder flowed in same way except solder was kept molten for one minute after it had flowed. Solution of wire very marked. Weakening of wire at edge of solder obvious. Right—Section through wire clasp which broke in service after abusive soldering. The solder completely dissolved this section of the wire, in effect converting it from wrought to cast metal.

Cause: When solder is melted and flowed on solid metal there is a tendency for the solid metal to be dissolved in the molten solder. This action is similar to that by which a piece of solid platinum may be dissolved and become liquid in a crucible of molten gold even though the temperature is well below the melting point of platinum.

An extremely small amount of such solution of the soldered parts may not be especially injurious and may even be beneficial in producing a closer bond with the solder. However, any considerable amount of solution almost invariably results in a weakening of the soldered parts at the edge of the solder, especially if they are of high strength wrought metal. Weakening at this point is particularly dangerous because it is usually the point of maximum stress and consequently is most susceptible to breakage.

Remedy: To avoid excessive solution of the soldered parts:

1. Keep the work and solder clean and well fluxed.
2. Do not keep the solder molten longer than absolutely necessary.
3. Do not heat the solder any higher above its melting point than absolutely necessary.
4. Use a solder that flows freely. A higher fusing free flowing solder is *less* likely to cause damage than a lower fusing solder which balls up and must be heated considerably above its melting point, or for a long time, before it flows.

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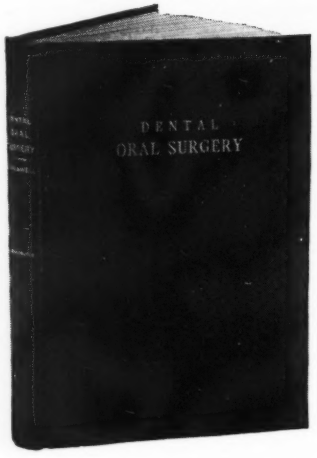

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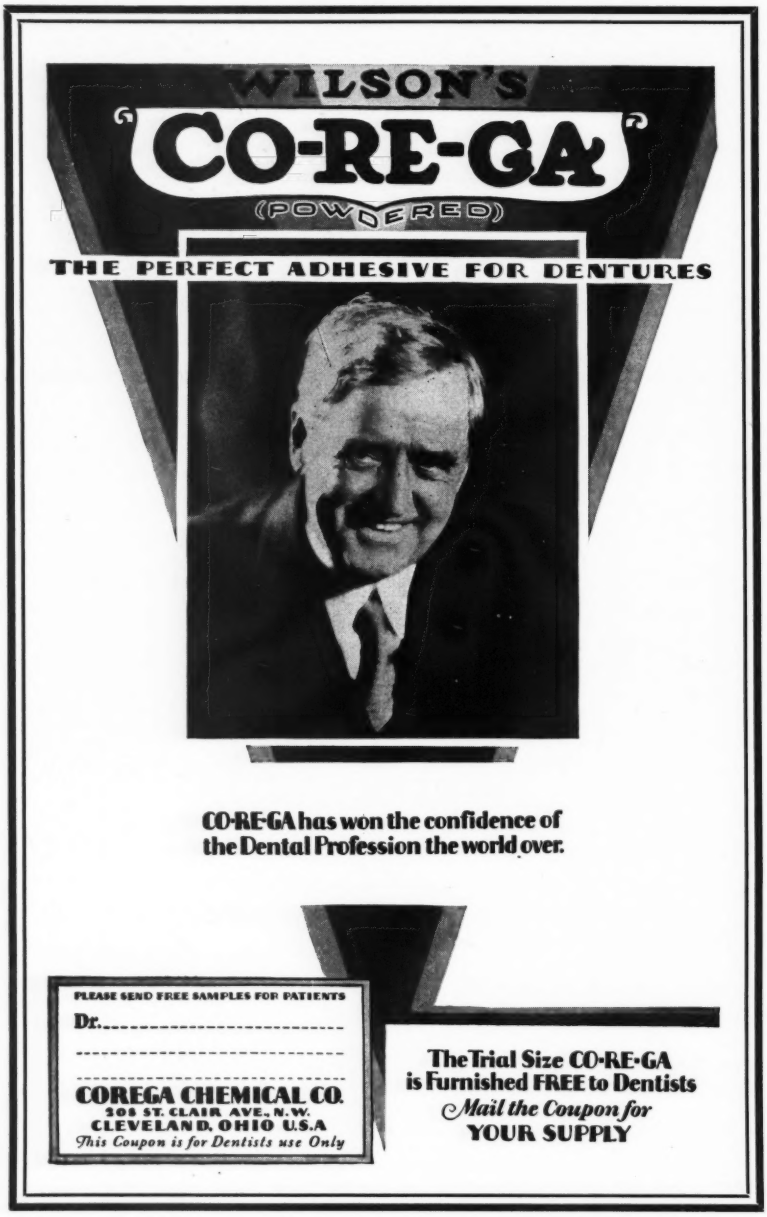
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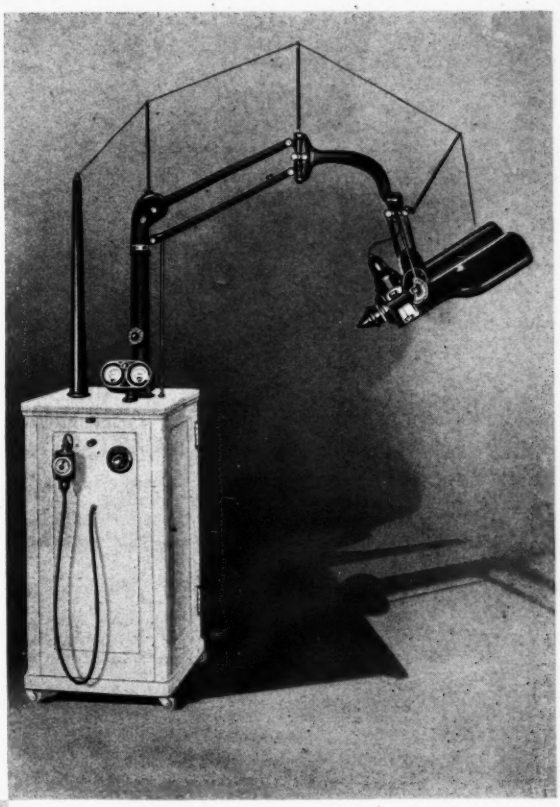

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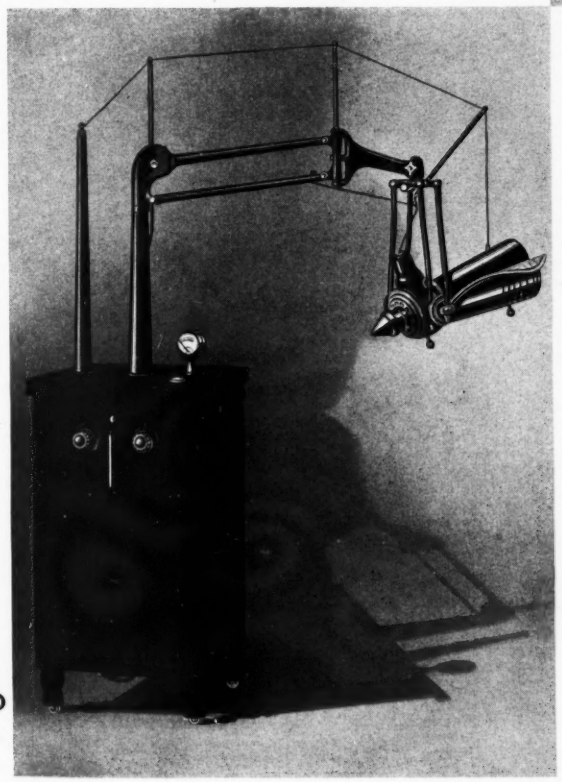

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